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A Milestone in the Literature on Bone Graft Surgery!

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BONE GRAFT SURGERY in DISEASE, INJURY and DEFORMITY

By

Fred H. Albee, M.D., LL.D., Sc.D., F.A.C.S., F.I.C.S.

President Elect, International College of Surgeons; Past President, American Orthopedic Association; Chairman, Rehabilitation Commission of the State of New Jersey; Assisted by ALEXANDER KUSHNER, M.B., B.Sc.

With a Foreword by H. Winnett Orr, M.D., F.A.C.S.,
Past President, American Orthopedic Association

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THE skeleton table of contents at the right shows the highlights of a work which brings you all the new and important advances and the time-tested procedures in bone graft surgery. The therapy of congenital absence of such bones as the radius, tibia and fibula and the Albee bone graft spine fusion operation, rendering a wide variety of affections of the spine less formidable, are but two samples of the valuable material included. It is a work which the alert surgeon can ill-afford to be without—a work based on many years of practice and pioneering in bone graft surgery. This indispensable new volume will stand for some time to come as the most complete and authoritative in its field.

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The Journal of the
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Volume III OCTOBER 1940 *Number* 5

The Surgical Treatment of Giant-Cell Tumors of Bone

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IT is not our intention to present a complete study concerning giant-cell tumors of bones, their etiology and pathogenesis, or their clinical appearance. We believe that true giant-cell tumors of bones are benign in character. They do not produce metastasis, but if they are not treated properly and precociously they may develop in such a manner that the cortical part of the bone shell will be completely destroyed. The tumor will show such a destructive picture of the epiphyseal end of the affected bone that local malignancy must be admitted. The surgeon is confronted with the problem of a growing osteolytic tumor, expanding toward a joint, and sometimes destroying the articular surface, as well as the cortex of the epiphyseal wall. When the tumor is localized at the lower femoral epiphysis, in the upper end of the tibia, or in any other of the weight-supporting joints, the functional disturbance of the affected limb is of much importance in determining the late prognosis of these cases. Imminent pathologic fracture also must be considered.

Opinions expressed in the literature concerning the prognosis and treatment of this type of tumor are frequently conflicting, but many of them emanate from such reli-

able sources that they are accepted without question by innumerable followers. An effort has been made by the writer to collect, in a synthetic way, the different procedures for treatment expressed in the literature, following which we shall attempt to discuss them, using as a basis our personal experience with cases of this type. Nevertheless, we should like to state in the beginning our tendency to believe that complete surgical resection is very often necessary to produce a permanent cure of giant-cell tumors. It is only in those cases in which radical measures cannot be accomplished that we are forced to accept other means of treatment, and, in doing so, we are aware always of the possibilities of not accomplishing complete healing.

It is likely that the different opinions concerning the prognosis and method of treatment of the giant-cell tumors may be explained by the conflicting evidence as to their etiology and the various theories accepted by individual surgeons.

Is it a tumor or is it not? If the former is accepted, is it benign? Can it transform itself into a malignant neoplasia, as suggested by Virchow, and apparently proved in the cases published by Tavernier, Coley, Nove Josserand and others? Since Lebert, in 1845, Paget, in 1853, and Nelaton, in 1860, to whom we owe the first descriptions of this condition, more recent studies which assist in answering these questions have been contributed by Bloodgood, Codman, Ewing, Mallory, Coley, Meyerding, Barrie, and others in America; Nove Josserand, Tavernier, Huet, Sabrazes, Platt, Putti, Camurati, and others in Europe.

Our own observation in these cases leads us to believe that the behavior of this bone lesion is more characteristic of a benign tumor than that of chronic inflammation, chronic irritation, or traumatic subcortical hemorrhage in cancellous bone, as suggested by Codman. We believe this to be true (1) because we have observed a progressive osteolytic condition that finally destroyed the cortex and even the articular surface of the bone, advancing toward the soft tissues and growing only as tumors do; (2) because the tumor will generally recur after curettage, and in some of our cases, after a primary healing, the bone used as a graft has been affected by the recurring tumor, and (3) because the recurrent tumor has frequently shown clinical, radiologic and pathologic evidence of increased local malignancy.

We also believe it is benign because the tumor is encapsulated and grows by expansion and not by invasion of the surrounding tissues. Furthermore, arteriography performed in four of these cases has never shown characteristic findings of malignancy, and, finally, in our experience, even in the cases with very marked local malignancy, we have never seen metastases.

In spite of the above reasons, we must admit, however, that different types of giant-cell tumors must be considered. The clinical evolution and even the histologic aspect of the specimen prove that a relatively large number of these tumors may become progressive, breaking the capsule and, as they advance, first expanding and afterward destroying the epiphyses, showing signs of what we have called "local malignancy." In most of these "aggressive" cases, as Ewing calls them, the pathologic reports have been somewhat confusing; nevertheless, they usually show an inclination to a certain malignancy in the stroma cells.

The vicinity of the joint in local malignant giant-cell tumors influences the prognosis. This is especially true of the weight-bearing joints. We have been forced to advise amputation in two cases seen in the advanced stage, as the only method of suppressing the tumor and of restoring the ability of the affected joint to bear weight by the use of an artificial limb.

TREATMENT

Undoubtedly, the selection of treatment in dealing with a giant-cell tumor is quite a difficult problem. As Coley and Higinbotham have stated recently, "Opinion is so widely divergent" that "until a more satisfactory answer has been found the profession should retain an open mind on the subject."

The treatment generally recommended is:

Conservative:
1. Radiotherapy.
2. Radium.

Surgical:
1. Curettage.
2. Curettage and packing with muscle, fat grafts, or even with some inorganic substance, such as Beck's paste or Mosetig-Moorhof's bone wax.
3. Curettage and bone chips or loose bone grafts filling the cavity.
4. Excision and bone grafts.
5. Resection.
6. Amputation.

RADIOTHERAPY.—Custis Lee Hall has published cases of giant-cell tumors which have been treated with radiation of the parathyroid glands. Our experience with this type of treatment has been limited, which may be due to the fact that in our cases radiotherapy has been unsuccessful, and, in two instances, local malignancy has become intensified as the result of using X-ray therapy. Nevertheless, at the Havana Cancer Institute, radiotherapy is recommended for all cases except those of the recurrent type, in which radiotherapy has been ineffective. It is their opinion, however, that radiation in the same dosage, such as that used in treating malignant bone tumors, should be employed for the recurrent type of giant-cell tumors.[1]

[1]We are indebted to Dr. Luis Fariñas, Radiologist of the Havana Cancer Institute, for this information.

On the other hand, Coley recommends the use of smaller doses of X-ray, with the cycles repeated less often, or at longer intervals, in order to obtain better results. In his series of cases, surgery alone yielded the largest proportion of excellent results, whereas, surgery combined with radiation gave the poorest results.

In the following case, radiotherapy aggravated the clinical symptoms and marked radiographic local malignancy resulted.

CASE 1.—E. I. A., a white Cuban woman, aged 24, seven months' pregnant, whose past history was without significance until November, 1938, when she noticed a small mass in her left wrist without the occurrence of trauma. The tumor gradually increased in size, later causing slight pain, limitation of motion, and loss of muscular strength. The first roentgenograms and arteriography were positive of a giant-cell tumor of the lower end of the radius (Figs. 1 and 2). Deep X-ray therapy was given up to a total of 1400 r. Two months later, when this patient was brought to our service, the tumor had increased and the hand was displaced toward the ulnar side. Slight pain, local heat, and marked limitation of the wrist motion were present. The next roentgenogram showed marked increase in the size of the tumor, with destruction of the epiphyseal external cortex, as well as the articular cartilage (Fig. 3).

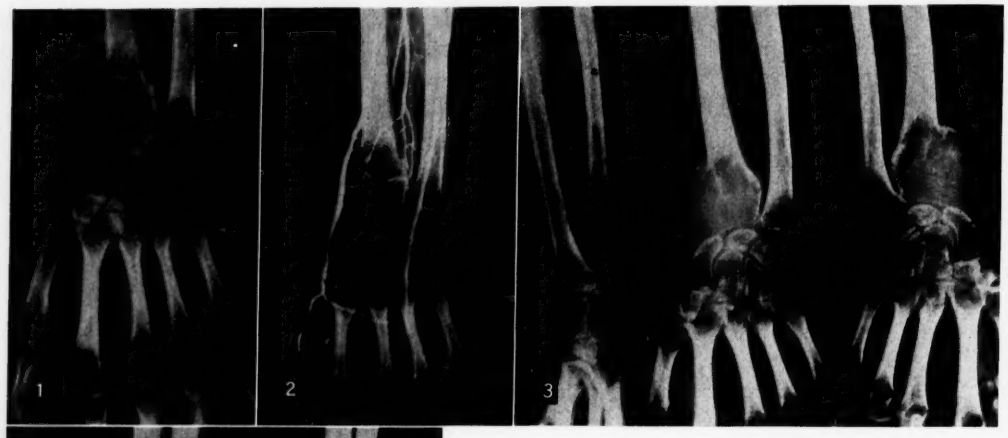
Operation.—Block resection and bone graft to supplant the bony defect, with implantation of the lower end of the graft into the carpal scaphoid, was done on May 3, 1939. At that time the tumor was larger than the one shown in the roentgenogram (Fig. 3), which was made in February, 1939. Primary healing and good union were obtained (Fig. 4).

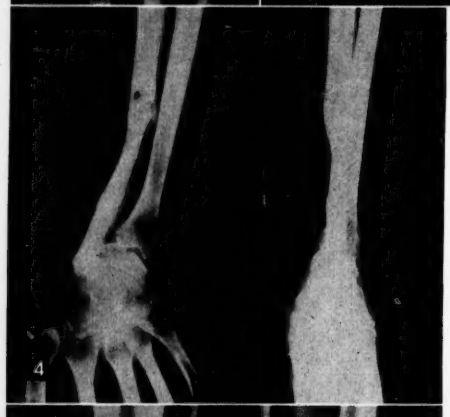
Seven months later, as the result of strenuous movement of the arm, the patient experienced acute pain and deformity of the wrist. Fracture of the graft had occurred.

Pathologic Report.—Giant-cell tumor. The specimen revealed great vascularization and hyperchromatism of the stroma cells, suspicious of histologic malignancy.

Results.—One year after the operation the patient had no pain. Good healing of the fracture had been accomplished, but limitation of motion at the wrist and thumb was present (Fig. 5). No recurrence or metastasis was indicated.

It is our opinion that radiotherapy alone should be used only when surgical treatment is not possible, as, for example, in giant-cell tumors of the vertebral bodies, deep cranial bones, etc.





CASE 1

Fig. 1. Giant-cell tumor of lower end of radius.

Fig. 2. Arteriography showing marginal arteries surrounding the tumor, with no signs of malignancy.

Fig. 3. Marked local malignant changes after radiotherapy.

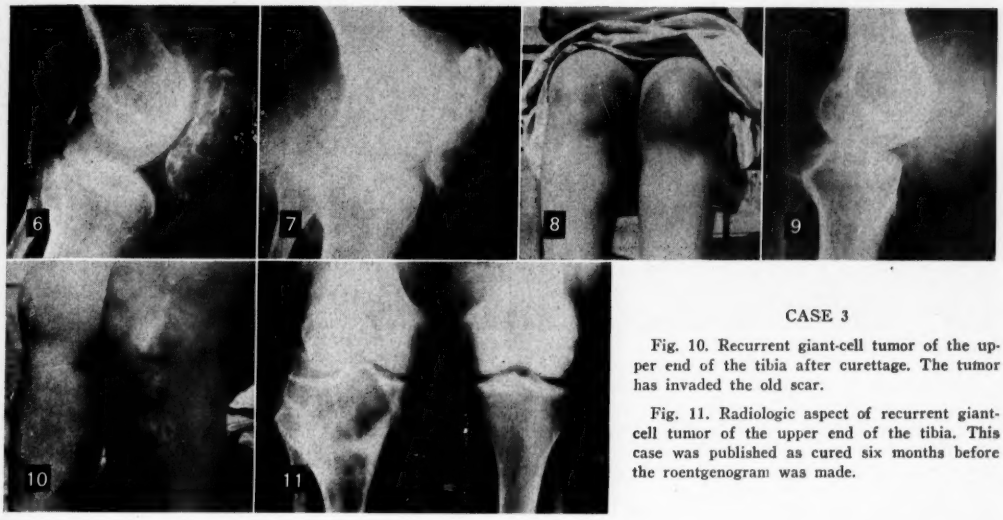
Fig. 4. Bone graft solidly united to the radial diaphysis and carpal scaphoid.

Fig. 5. Traumatic fracture of the graft showing good healing.

RADIUM.—We have had no experience with the radium pack in giant-cell tumors, for which reason we shall not discuss this treatment.

CURETTAGE.—According to statistics published (Geschickter and Copeland, Bloodgood, Coley), recurrences are present in over 30 per cent of the cases of giant-cell tumors treated by primary curettage. Nevertheless, this type of treatment is recommended by the majority of authors appearing in the literature which we have consulted. Coley and Higinbotham advocate curettage and swabbing of the cavity with zinc chloride, flushing with Dakin's solution or normal saline, and closing the wound layer-by-layer. They believe it unwise to fill the curetted cavity with bone chips, and they also condemn the use of muscle and fat grafts.

We are not inclined to believe that curettage alone, or curettage followed by cauterization, is the best method of treatment in every case of giant-cell tumor of the bone. The following two cases are presented as examples of characteristic local mal-



CASE 2

Fig. 6. Radiologic aspect of giant-cell tumor of the patella before operation.

Fig. 7. After curettage and radiotherapy. Recurrence.

Fig. 8. Appearance of the tumor after recurrence when the patient was admitted to the hospital.

Fig. 9. Radiologic aspect of the tumor. Complete disappearance of the bone trabeculæ, and marked enlargement of the tumor.

CASE 3

Fig. 10. Recurrent giant-cell tumor of the upper end of the tibia after curettage. The tumor has invaded the old scar.

Fig. 11. Radiologic aspect of recurrent giant-cell tumor of the upper end of the tibia. This case was published as cured six months before the roentgenogram was made.

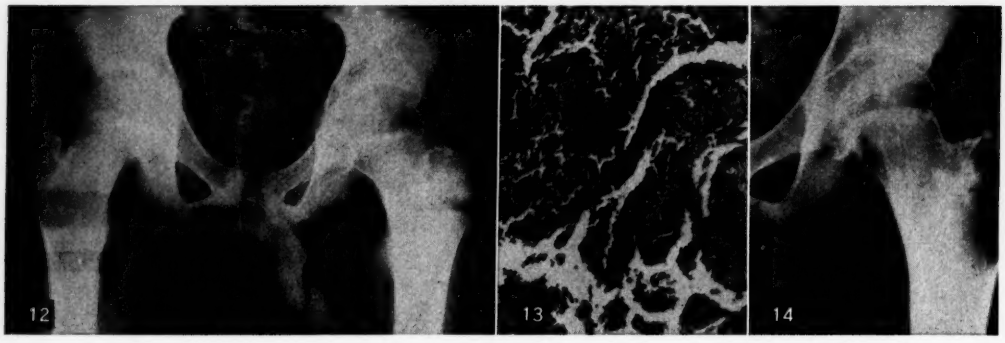
ignancy observed in recurrences after treatment of the tumor by curettage.

CASE 2.—A. B. P., a white Cuban woman, aged 49, had never been ill prior to the present illness. In November, 1937, the patient stumbled but did not fall. This accident was followed by pain and edema in the left knee. These symptoms persisted for a long time. Walking was difficult. Rest diminished the pain, but did not afford complete relief. She received treatment for rheumatism by the use of salicylates, without any improvement. In April, 1938, a giant-cell tumor of the patella was diagnosed at another hospital and curettage, with gauze packing for twenty-four hours, was done. Two months later healing was obtained. The aspect of the lesion before the operation is shown in Figure 6. In July and November, 1938, and in July, 1939, radiotherapy was given. The tumor during this course of treatment is shown in Figure 7, taken in February, 1939. Five months after the last treatment, which was given in December, 1939, the patient experienced much discomfort and was unable to walk. Great limitation of the joint's motion was observed. The tumor had greatly increased in size and there was involvement of the surrounding soft tissues. The aspect of the tumor and the changes observed following radiotherapy, with complete disappearance of the patella, are demonstrated clearly in Figures 8 and 9. The patient is in the hospital at present under postoperative observation. A total resection of the tumor has been done with plastic repair of the patellar defect, using a pedicle graft of fascia lata.

CASE 3.—H. R. A., a white Cuban woman, aged 25, had always been healthy until six years ago, when she had an ovariectomy and cervical amputation. Her present illness began five years ago. At that time, no trauma was present, but she experienced slight pain and discomfort of the left knee, and, as a result, received treatment for a rheumatic condition. Two years later she suffered greater pain. A tumor at the upper end of the tibia was observed, causing limping and great local tenderness. The patient was operated upon in September, 1937, by means of curettage and iodoform gauze packing in another hospital, and healing was obtained after three months. Later, this case was published by the surgeon who considered the results permanent. Nevertheless, in March, 1938, the patient suffered pain, limping, and the tumor reappeared. Radiotherapy was employed without success. By March, 1940, the patient experienced great difficulty in walking, and a tumor, which seemed to have invaded the old scar, was very marked at the upper end of the tibia. Local heat and superficial venous circulation were noted. Evident signs of localized malignancy were present. The aspect of the recurrent tumor and the advanced osteolytic destruction of the upper end of the tibia are shown in Figures 10 and 11. At the present time the patient is on our service awaiting new surgical treatment.

In cases of this type, where local malignancy is so marked, resection with immediate transplantation of a large massive graft, or amputation, seems to be the only method of choice.

CURETTAGE AND PACKING WITH MUSCLE, FAT GRAFTS, OR INORGANIC SUBSTANCES.—We have employed only to our satisfaction the packing of bone cavities with muscle or



CASE 4

Fig. 12. Benign giant-cell tumor of the trochanter.
Fig. 13. Microphotograph showing benignity of the stroma cells.
Fig. 14. Complete cure after curettage and packing with bone chips.

fat following chronic osteomyelitis. In one case of giant-cell tumor, however, which we treated by curetting and then packing the cavity with granulation tissue, we cannot claim success. In this instance, the tissue was transplanted from another patient after resection of an old scar resulting from an extensive, although uninfected, burn of the axilla. We have not employed muscle or fat grafts, inorganic paste (Beck) or bone wax (Mosetig-Moorhof) in any of our cases of giant-cell tumors. Some surgeons report success after using these methods.

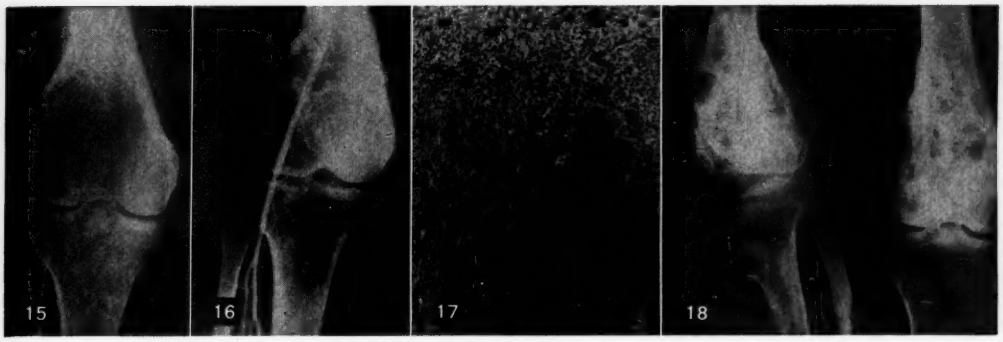
CURETTAGE AND BONE CHIPS OR LOOSE BONE GRAFTS FILLING THE CAVITY.—This surgical procedure is employed more often in the treatment of bone cysts than in giant-cell tumors, and even though we have thought it wise to discard its use altogether, there are many surgeons who believe this method to be the best choice of treatment for giant-cell tumors. It is our opinion, however, that this method can be used successfully in those cases in which there is evidence of local malignancy and the stroma cells show tendency toward fibrosis. The following case is an interesting example of this type of tumor; nevertheless, we must call attention to the fact that the pathologic and clinical aspects of this giant-cell tumor are quite different from other cases reported herein.

CASE 4.—M. L. L., a white Cuban boy, aged 14 years, whose previous history is irrelevant, had complained of increasing discomfort in the left knee and limping since July, 1938, without any history of trauma. Finally, the pain localized in the left hip. At that time he was seen in our out-patient department and his condition was diagnosed as possible tuberculous osteitis of the trochanter. During the following three months the patient was kept in a plaster cast and a general course of treatment was carried out. No improvement was obtained. Another roentgenogram revealed a localized osteolytic condition of the left trochanter, with thinning of the cortex and expansion of the trochanter (Fig. 12). Curetting of the trochanter was performed in May, 1939. A mass of sponge-like tissue was removed for microscopic examination. Bone fragments from the tibia were used to fill in the cavity, and a plaster spica was applied. Immobilization was maintained during five months.

Pathologic Report.—The section showed a few typical myeloplaxes or giant cells, with stroma formed by histiocytes and lymphocytes and gross fibrous and collagenous bands in some parts of the specimen. The evolution of these giant-cell tumors is toward spontaneous sclerosis (Fig. 13).

Results.—Complete healing in May, 1940, with negative symptomatology. Roentgenogram revealed re-establishment of normal bone trabeculæ (Fig. 14).

EXCISION AND BONE GRAFTS.—The majority of surgeons will try to save the function of the joint whenever the giant-cell tumor



CASE 5

Fig. 15. Typical giant-cell tumor of the lower end of the femur at the external condyle.

Fig. 16. Arteriography showing no signs of malignancy.

Fig. 17. Histologic aspect of the tumor.

Fig. 18. Result of excision and massive bone graft. Joint mobility saved, but the bone structure is far from normal.

is localized in the vicinity of a weight-supporting joint. To carry out this purpose, a partial resection or excision, with curettage of the entire tumor, is done in order to leave a shell bone in which to place solid grafts from the diaphyseal end of the bone to the epiphyseal shell. This surgical procedure is generally employed in conditions involving the upper end of the tibia and the lower end of the femur.

Our experience with excision and bone grafts in giant-cell tumors which have shown local malignancy is not convincing, as we have been unable to obtain a complete repair of the bone tissue, such as is shown in Case 4. Furthermore, we have had recurrences, some of which have had rapid growth, as illustrated in Case 7; others showed only a partial reconstruction of the bone which lacked the normal aspects of bone tissue.

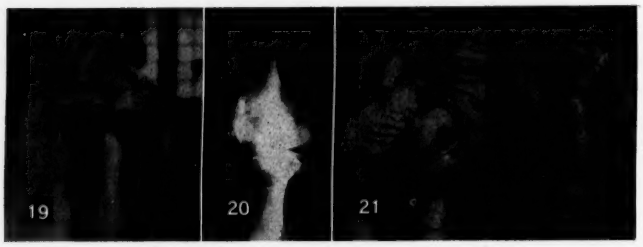
The following case is an example of treatment by excision and bone grafts:

CASE 5.— J. H. D., a colored Cuban woman, aged 30, whose past history had been irrelevant until June, 1937, following a fall on her right knee, after which she complained of swelling, pain, and limping. Eight months later the patient fell again on the same knee, causing increased swelling, fever, and marked functional disturbance of the joint. The condition was treated by different drugs. Three months later, as the patient noticed no improvement, she came to the hospital, and an examination of the right knee revealed lateral enlargement of the external aspect, well localized on the external condyle, local heat, pain, limitation of flexion and extension and lateral instability of the knee, as well as marked muscular atrophy of the thigh. Roentgenogram (Fig. 15) showed a typical giant-cell tumor of the lower end of the femur at the external condyle. Arteriography showed no signs of malignancy (Fig. 16).

Operation.—The following procedure was carried out on September 28, 1938: Excision of the tumor; partial resection of the capsule and thin cortex of the lateral anterior aspect of the external condyle; curettage of a very large cavity with cleaning of the whole soft tumor, leaving the endosteal aspect of the external condyle undisturbed; transplantation of a large massive graft from the tibia, placing it between the diaphysis and the articular end of the epiphysis, thus maintaining the thin shell of the condyle in proper position; placement also of extra grafts as a scaffold to prevent collapse of the weak, empty shell. The patient's knee was placed in a plaster cast for three months. Primary healing was obtained. Radiographic checking indicated a slight recurrence of the tumor and radiotherapy was administered.

Pathologic Report.—The section showed a giant-cell tumor with very numerous giant cells. Hyperchromatism and karyokinesis of the stroma cells were present, indicating the absence of an entirely benign prognosis (Fig. 17).

Results.—Twenty months have elapsed since this operation, and the patient experiences no pain on weight-bearing, walks without a cane and has only a slight limp. Complete extension of the knee has been obtained, although flexion is limited to a 45° angle. Roentgenograms reveal great improvement, but the



CASE 6

Fig. 19. Giant-cell tumor of the left patella.

Fig. 20. X-ray appearance of giant-cell tumor of the patella.

Fig. 21. Postoperative result after complete resection and plastic repair with a pediculated graft of fascia lata.

aspect of the bone trabeculæ is abnormal and the grafts are still noticeable and well limited. The cortex is uniform (Fig. 18).

RESECTION.—Because of the successful use of this surgical procedure for many years, we are inclined to believe that its true merits as a method of treatment have not been recognized by the profession in general. Our experience with block resection and bone transplants in progressive localized osteitis fibrosa has been published in a previous article; nevertheless, we should like to say here that we have followed our cases treated in this manner for many years, and we have had no recurrences. We also have had cases of giant-cell tumors in which resection has been used which resulted in permanent cures.

We are inclined to believe that in cases with marked local malignancy, or in recurrent cases after curettage, as those illustrated in Cases 2 and 3, block resection must be done to obtain permanent cure. The bone defect can be filled with an autogenous bone graft, or, as in the cases presented by Huet and others, using similar epiphyses obtained from recently amputated limbs.

The following cases are presented to illustrate the successful results obtained in giant-cell tumors treated by complete resection:

CASE 6.—M. I. Q., a white woman, aged 35, whose past history had been irrelevant until May, 1927, when she fell on her left knee, suffering pain, edema, and functional limitation. The pain was not relieved and a tumor appeared at the anterior aspect of the knee cap. Examination revealed a painful enlarged patella, forming a tumor about the size of a small orange, reddish in color, and with local heat. There was no pulsation or fluctuation, but the voluntary extension was limited to 160°, and flexion was painful and limited (Fig. 19). Roentgenograms revealed enlargement of the patella, very thin cortex, and typical irregular cell formation, suggestive of giant-cell tumor (Fig. 20).

Operation.—On May 25, 1929, resection of the tumor was done with plastic repair of the defect by the use of a pediculated flap of fascia lata.

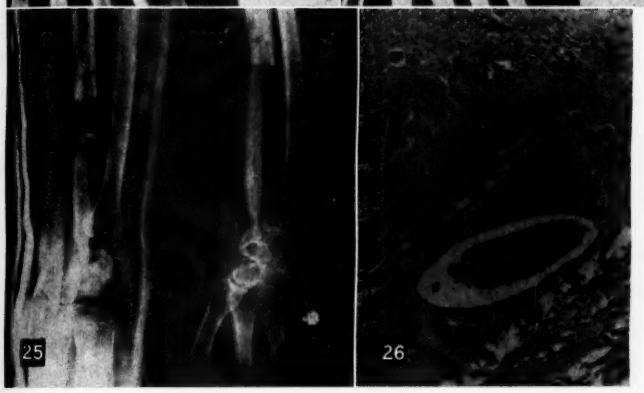
Pathologic Report.—The section is that of a benign giant-cell tumor.

Results.—Complete cure and functional restoration. This patient has been followed for a period of ten years (Fig. 21).

CASE 7.—M. L. G., a white Cuban woman, aged 24, whose past history had been unimportant until February, 1939, when she complained of pain at the lower end of the left forearm. She had no previous history of trauma. Examination revealed edema; a growing mass at the lower aspect of the left radius which was very prominent in the dorsal and frontal plane just above the wrist; local heat; superficial venous circulation; limitation of wrist motion; and limited pronation and supination. Roentgenograms showed a giant-cell tumor at the lower end of the radius, with complete disappearance of the anterior cortex and anterior articular surface of the radius (Fig. 22).

Operation.—In an effort to save the function of the joint, a partial resection was done on May 29, 1939, leaving the articular cartilage. In order to fill this defect, bone grafts taken from the tibia and shaped to reproduce the lower radial end were used. The results are shown in the roentgenogram of October 20, 1939 (Fig. 23). In January, 1940, eight months after the operation, the patient returned to the hospital with a recurrent tumor at the anterior aspect of the lower radial epiphysis (Fig. 24). No improvement was obtained from the use of radiotherapy. She was admitted to the hospital, and on April 3, 1940, a complete massive resection of the lower end of the radius with bone graft was performed. Primary healing has been obtained, but the patient is still under observation (Fig. 25).

Pathologic Report.—The section consists of numerous giant cells with abundant nuclei placed underneath a fibromuscular capsule presenting a degenerative lesion of muscular fibers. Multiple myeloplaxes seem to be contained within a lymphatic vessel. There is hyperchromatism with mitoses of the stroma cells.



CASE 7

Fig. 22. Giant-cell tumor of lower end of radius.

Fig. 23. Result obtained after excision and bone graft. Joint motion preserved.

Fig. 24. Recurrence. Antero-external tumor with evident local malignancy.

Fig. 25. Block resection of lower end of radius and bone graft.

Fig. 26. Histologic aspect after recurrence.

The giant cells are advancing toward the soft tissues with histologic malignancy of the stroma cells (Fig. 26).

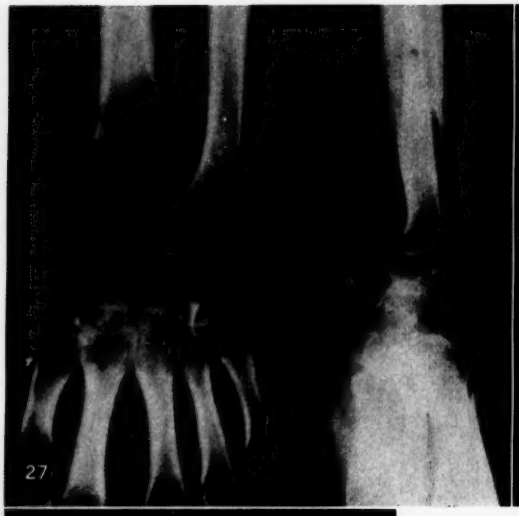
CASE 8.—J. S. D., a white Cuban man, aged 33, whose previous history had been unimportant until February, 1939, when, without any knowledge of previous trauma, he noticed pain at the left wrist accompanied by lack of strength and inability to continue his work as a truck driver. Examination a month later revealed a small mass at the lower end of the left radius, slightly painful under pressure, with marked restriction of wrist motion. Roentgenograms showed a giant-cell tumor of the lower end of the radius, with the disappearance of the anterior aspect of the radial cortex (Fig. 27).

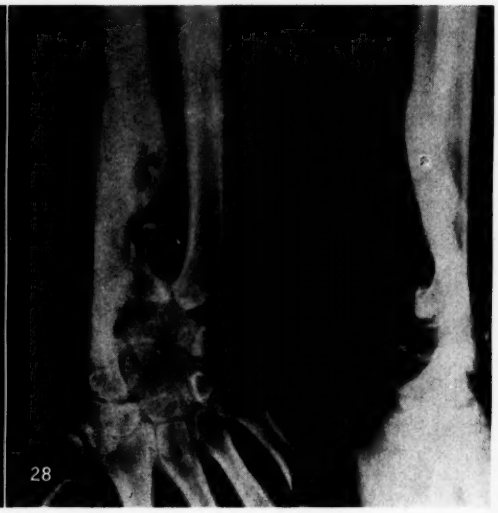
Operation.—On July 5, 1939, a block resection was done on the lower end of the radius and a thick graft, transplanted from the tibia, was inserted into the carpal scaphoid. Splints were kept on for twelve weeks, and primary healing was obtained (Fig. 28).

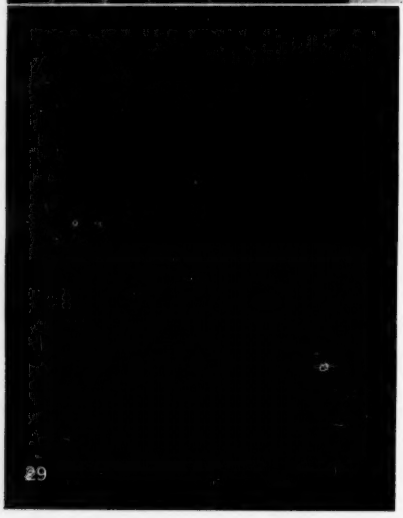
Results.—In November, 1939, the patient was able to return to work, with sufficient wrist motion to continue his employment without discomfort or difficulty (Fig. 29).

Pathologic Report.—The section is a typical giant-cell tumor, with a few mitotic cells in the stroma and a limited amount of hyperchromatism.

It is our opinion that giant-cell tumors should be treated by massive extra-periosteal resection, followed by a thick autogenous bone graft to fill in the bone defect whenever they show clinical and radiographic local malignancy, with a positive histologic report of malignant changes in the stroma cells. There should be no question regarding this method of treatment in my opinion if the tumor is localized in the epiphyseal end of the bones not forming a joint, such as the upper end of the fibula, the lower end of the ulna, the metatarsal bones, or the ribs. Nevertheless, even in tumors localized at the joint end of bones, or in the recurrent types after curettage or excision, if these malignant signs are present resection must be considered in time to avoid amputation, which is, after all, the only choice left to the surgeon for the treatment of tumors that







CASE 8

Fig. 27. Giant-cell tumor of lower end of radius. Evident local malignancy.

Fig. 28. Ten months after operation. Resection and bone graft.

Fig. 29. Functional result of the wrist. The patient is employed as a truck driver.

are allowed to become too extensive and too destructive.

AMPUTATION.—We have performed amputations in two cases with very large and destructive giant-cell tumors of the lower end of the femur. One of these was published in February, 1929. At the time of operation we believed that the tumor was an osteolytic bone sarcoma. Four of the five pathologic reports were conclusive of malignancy, whereas the other one reported a giant-cell tumor. We followed this case for six years after the operation, and the last time we heard from the patient he had shown no indications of metastasis.

We are inclined to sustain the opinion that a properly treated giant-cell tumor should never reach the stage where amputation is necessary. If the surgeon is consulted in time, the different surgical procedures, previously discussed here, should detain or cure the condition.

The writer wishes to express his appreciation to his assistants, Dr. U. Sosa and Dr. I. Pascau, for their help in collecting this material, to the Radiologic Department of the Mercedes Hospital for its generous cooperation, and to Dr. Gomez Camejo for his valuable pathologic reports.

CONCLUSIONS

A series of cases is reported to illustrate and discuss different surgical procedures

for the treatment of giant-cell tumors of bones. Two of these cases are giant-cell tumors of the patella, a very rare localization of this lesion.

Giant-cell tumors presenting clinical, radiographic, and pathologically benign aspects should warrant treatment by curettage, curettage plus bone graftings, or excision and bone grafting; that is, if a complete cleaning of the tumor is done and primary healing is obtained.

Treatment by block or massive resection should be done in recurrent cases with local malignancy, and in the "aggressive" type with clinical and radiographic indications of malignancy and with pathologic reports of malignant changes in the stroma cells. The bone defect must be filled in to preserve the form and length and to guarantee weight-bearing, even at the expense of very limited or entire loss of the joint motion.

Amputation should never be performed, except in cases (1) encountered by the surgeon for the first time in a far advanced stage; (2) infected after a previously unsuccessful curettage, or (3) with positive signs of malignancy.

RÉSUMÉ

Le traitement chirurgical des tumeurs à cellules géantes de l'os

Une série de cas est exposée pour illustrer et discuter diverses procedures chirurgiques pour le traitement des tumeurs à cellules géantes de l'os. Deux cas sont tumeurs à cellules géantes de la patelle, une localization très rare de cette lésion.

Pour les tumeurs à cellules géantes qui presentent aspect clinique, radiologique et pathologique bénin il sera necessaire traitement avec curettage, curettage avec greffe d'os ou excision et greffe d'os; ça est si on obtient un complet enlèvement de la tumeur et une cicatrization primaire. Traitement avec résection en blocs ou massive devrait être fait dans les cas récurrents avec malignité locale et dans le type "aggressif" avec indications cliniques et radiologiques de malignité et avec changements malins dans les cellules du stroma. Le defect de l'os doit être rempli pour conserver la forme et la longeur et pour garantir le soutien du poid, aussi aux dépens d'une motilité articulaire très limitée ou aussi éntièrement perdue.

Amputation ne doit jamais être accompli, à l'exception de cas qui viennent chez le chirurgien pour la première fois, trop avancés ou infectés après un precedent curettage sans succès ou des cas avec réels signes de malignité.

ZUSAMMENFASSUNG

Chirurgische Behandlung von Riesenzelltumoren des Knochens

Es werden eine Reihe von Fällen berichtet, um das chirurgische Verfahren der Behandlung von Riesenzelltumoren des Knochens zu beschreiben und zu besprechen. Zwei dieser Fälle sind Riesenzelltumoren der Patella, eine sehr seltene Lokalisation für diese Laesion.

Riesenzelltumoren, die sowohl klinisch als auch röntgenologisch und pathologisch ein gutartiges Bild ergeben, rechtfertigen eine Behandlung mittels curettage, curettage plus Knochenimplantation oder Excision und Knochenimplantation; das heisst wenn vollkommene Reinigung vom Tumor vorgenommen wird und primäre Heilung erreicht wird.

Eine Behandlung mittels Block oder ausgedehnter Resection soll in rezidivierenden Fällen mit localer Bösartigkeit und in "aggressiven" Fällen mit klinisch und röntgenologischer Indikation für Bösartigkeit und dem pathologischen Befund von bösartigen Veränderungen im Stroma der Zellen, vorgenommen werden. Der Knochenverlust muss ausgefüllt werden um Form und

Länge zu wahren und um die Belastbarkeit zu sichern, selbst auf Kosten einer starken Einschränkung oder vollkommenen Verlust der Gelenksbeweglichkeit.

Amputation soll, nie vorgenommen werden, ausser in solchen Fällen, die bereits in einem zu vorgeschrittenen Stadium zum ersten mal zum Chirurgen kommen oder in Fällen mit eindeutigen Zeichen von Malignität.

RESUMEN

Tratamiento quirurgico de tumores del hueso de celula grande

Se describe una serie de casos para ilustrar y discutir métodos quirurgicos distintos para tratamiento de tumores del hueso de célula grande. Dos de los casos son tumores dela rótula, una localización muy rara de esta lesión.

Tales tumores – los de célula grande – mostrando aspecto clínico, radiográfico, o aspecto benigno patologicamente, merecen tratamiento por "curettage," curettage más injerto del hueso, o excisión y injerto, es decir, con tal de que puedan obtenerse una limpia completa del tumor y una curación primaria.

Tratamiento por resección maciza debe hacerse en casos de repitición con malignidad local, y en el tipo "agresivo" de indicaciones clínicas y radiográficas de malignidad y informes patológicos de cambio maligno en las células de estroma. El defecto del hueso debe llenarse para que se conserven la forma y el largo y para garantizar el poder de llevar peso aunque se limite mucho o se pierde por completo la articulación de la juntura.

No debe hacerse nunca una amputación excepto en esos casos que vienen por primera vez al cirujano en estado demasiado adelantado, o infectados despues de un "curettage" previo sin éxito, o en casos que indican una malignidad positiva.

RIASSUNTO

Il trattamento chirurgico dei tumori a cellule giganti dell'osso

E riportata una serie di casi per illustrare e discutere differenti procedimenti chirurgici per il trattamento dei tumori a cellule giganti delle ossa. Due di questi casi sono tumori a cellule giganti della rotula, una localizzazione assai rara di questa lesione.

Tumori a cellule giganti che presentino aspetto clinico, radiologico e patologico benigno richiederanno trattamento con raschiamento, raschiamento più innesto osseo o svuotamento e innesto osseo; ciò avviene se si fa una completa asportazione del tumore e una cicatrizzazione per prima.

Trattamento con resezione a blocchi o massiva dovrebbe farsi nei casi ricorrenti con malignità locale, e nel tipo "aggressivo" con indicazioni cliniche e radiologiche di malignità e con reperti patologici di metamorfosi maligne nelle cellule dello stroma. Il difetto d'osso deve essere riempito per conservare la forma e la lunghezza e per garantire il sostegno del peso anche a spese di una grande limitazione o addirittura intera perdita della motilità articolare.

Amputazione non dovrebbe mai farsi, eccetto nei casi che vengono al chirugo per la prima volta troppo avanzati o infetti dopo un precedente raschiamento senza successo o in casi con segni positivi di malignità.

The Ambulatory Treatment of Recent Fractures of the Intracapsular Neck of the Femur Following Threaded Wire Fixation*

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AMBULATORY treatment of fractures of the neck of the femur was advocated and successfully employed by Bradford in 1919. This courageous pioneer on the frontier of American orthopedic surgery justified such a radical departure from the orthodox Whitman method as follows: "As the patient was sixty-four years of age and older in her condition even than her years, the usual unfavorable results of this fracture from long confinement in bed and joint stiffness following long fixation threatened a serious affliction of permanent if not total disability to a dependent, working woman without home or resources." " . . . plaster bandage, which causes atrophy of the fat, muscle, and, as has been shown by skiagram, also of bone tissue, and therefore is not favorable to bone healing."

Although I but recently read the interesting treatise in which Bradford reported the successful management of three fractures of the hip by means of an abduction-traction-ambulatory splint, I have long been convinced of the importance of sparing the adult, and in particular the elderly patient, the devastating result of long immobilization in a plaster cast. With his plea for early ambulation following fracture of the hip, I am in complete agreement.

The value of early activity after fractures of various kinds has become increasingly recognized during the past few years. The possibility of ambulatory treatment of fractures of the neck of the femur were, for the most part, considered impractical because of the difficulty in maintaining immobilization of a fracture in which the proximal fragment was not under direct control and the standard method of treatment consisted of a large, awkward and heavy body and leg cast. Apfelbach and Aries, in 1936, and Kleinberg, in 1937, each reported a series of cases in which patients were encouraged to walk with crutches within a short period after reduction and plaster cast immobilization of the fracture. Because of the advanced age of the average patient who sustains an intracapsular fracture of the neck of the femur, this method of treatment was regarded by most surgeons as a rather heroic measure. The advantages, however, in instances where it proved to be possible to persuade these patients to walk, were well established by the authors.

During the period from February, 1929, to October, 1936, 16 recent fractures of the intracapsular portion of the neck of the femur were treated by several different surgeons in the University of Chicago Clinics. The results obtained were, indeed, discouraging. Nine of the 16 patients were treated by the Whitman abduction cast; two by open reduction and insertion of tibial bone grafts followed by plaster cast immobilization; two by means of a Smith-Petersen nail and plaster cast; one by means of the Roger

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Anderson well-leg traction splint, and two were simply permitted to lie in bed with sand bags.

Of the 16 patients so treated, the following were the results:

RESULTS OF TREATMENT OF 16 RECENT FRACTURES OF THE INTRACAPSULAR PORTION OF THE NECK OF THE FEMUR

RESULT	CASES	AGE
Non-union	5	29-63
Death from bronchopneumonia	3	75-79-80
Union with subsequent necrosis and collapse of femoral head	2	15-56
Not followed long enough to know the results (returned to family physician)	3	
Obtained union with satisfactory end-result (incidence of known good results of only 18.7)	3	3½-62-96

Since October, 1936, I have personally treated 10 patients with recent intracapsular fractures of the neck of the femur by early reduction and internal fixation with threaded steel wire. The ages of these patients varied between 32 and 77 years. Five patients were treated at the Albert Merritt Billings Hospital of the University of Chicago, and five in other Chicago hospitals.

The fracture in one case was treated by open reduction because of other injuries including fractures of the shaft of both femurs, which made it impossible to perform a closed reduction of the hip. This patient was the only one of the 10 treated by this method who could not become ambulatory within a few days after the wire fixation. One of the 10 patients was pinned with one threaded wire, and because it was found that no additional wires of this type were available, four Kirschner wires were used also. The smooth Kirschner wires all worked out and had to be removed. It was necessary then to apply a knee-length spica plaster cast, but the patient continued to be ambulatory. For eight patients, no cast, splint or other external method of fixation was necessary.

The hip of the oldest patient treated by this method (L. C., aged 77 years), was pinned June 21, 1938. She was last seen in March, 1939, at which time she was walking very well with the aid of a cane, but the roentgenogram did not show solid bony union, although the alignment of the fracture fragments had been maintained.

To the present time in this very small series of cases, there have been no nonunions and no aseptic necroses of the heads of the femurs. Seven patients have obtained complete bony union in satisfactory position with functionally excellent end-results. One patient has a good functional result, but has not been persuaded to come in for an end-stage roentgenogram. Two patients were treated within the past six months, but the question of union cannot be determined at this time.

Fractures of the neck of the femur were reduced either by the Leadbetter method or, as was true in most of the cases, by moderate traction, abduction of about 30 degrees and internal rotation. The earlier cases were reduced and pinned under fluoroscopic control. It was found, however, to be more satisfactory if the wires were inserted following the technic described by Austin Moore, using anatomic landmarks and checking position of the wires by means of roentgenograms.

For the purpose of fixation, we have selected a threaded stainless steel wire of a composition of 18 per cent chromium and 8 per cent nickel, gauge 0.080, with 56 threads to the inch, ten inches in length. Experimental tests proved that this wire obtained a holding power in the bone which required approximately 100 pounds pull in

order to withdraw it. Three such wires accurately placed required an average pressure force of 543 pounds to displace the femoral heads of each of twelve hips obtained at necropsy, fractured, and immediately immobilized in reduced position.

TECHNIC OF INSERTION OF THREADED WIRES

Immediately after reduction, in which the heel-in-palm test indicates engagement of the fragments at the fracture line, a roentgenogram is made in the anterior-posterior and in the lateral planes. An attempt is made to produce a valgus position by increasing the traction or the abduction.

The tip of the trochanter is identified and an Allis forceps is attached to the skin at this point. A second Allis forceps is attached to the skin at a point which is exactly over Poupart's ligament, halfway between the anterior-superior spine of the ilium and the site of attachment of this ligament to the pubic bone. The length of wire to be inserted is carefully determined. Depending upon the amount of soft tissues present, the threaded steel wires are inserted through the skin laterally 2 to 2½ inches below the tip of the greater trochanter. The point of the wire should strike the femur approximately 1½ inches distal to the trochanteric tip.

If the hip is accurately reduced and held in a position of approximately 30 degrees abduction and 30 degrees internal rotation, the neck of the femur will lie parallel to the flat surface of the top of the operating table. By probing with the wire, which has been forced through the skin and subcutaneous tissue, contact is made with the center of the shaft of the femur 1½ inches below the tip of the trochanter. The drill is then held parallel to the plane of the top of the operating table. It is pointed as one would aim a rifle, toward the tip of the Allis forceps attached to the skin over the mid point of Poupart's ligament.

The wires are inserted by means of a drill fitted with a small chuck or, what has proved to be more satisfactory, a drill originally planned for the insertion of Kirsch-

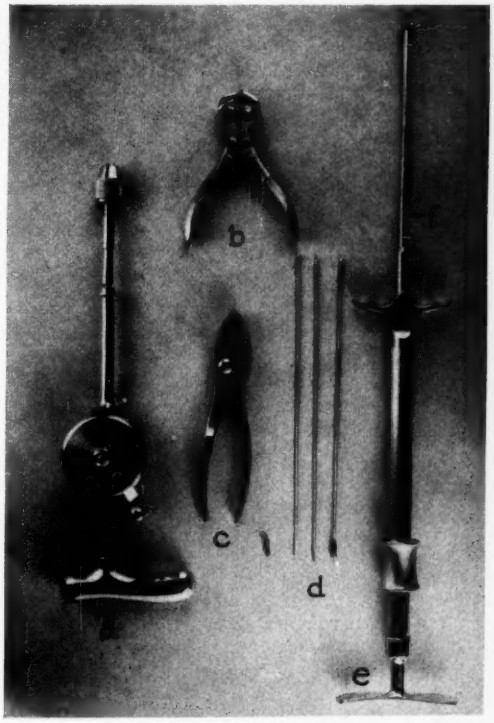

Fig. 1. Armamentarium for inserting threaded steel wires for internal fixation of intracapsular fractures of the neck of the femur. *(a)* Drill fitted with a small chuck which can be used either for inserting or withdrawing the wires. Since these wires are of a relatively small gauge, if the bone is quite hard the insertion without the use of a guide surrounding the wire may be rather difficult. For that reason, we have found it more practical to use the so-called Kirschner-Stille drill *(e)* which operates with great ease and has the advantage of a guide *(f)* which telescopes back into the drill as the threaded wire penetrates deeper into the tissues. The opening in this drill had to be re-bored to make it slightly larger in order to accommodate the threaded wires, the gauge of which exceeds that of any of the standard Kirschner wires. *(b)* Double action wire cutter. *(c)* Ordinary pliers. *(d)* The ten-inch threaded stainless steel wires. The small nuts shown are not used in the method described unless an open reduction proves to be advisable. One end of the wire is sharpened for cutting through the cortex of the bone and the other is made flat in order that it may fit into the grasping slot of the drill.

ner wires operated on the principle of a carpenter's chisel with a worm drive (Fig. 1).

After inserting one wire a second roentgenogram is made. The wire is then adjusted for depth as well as for position. Two or three additional wires are now inserted so

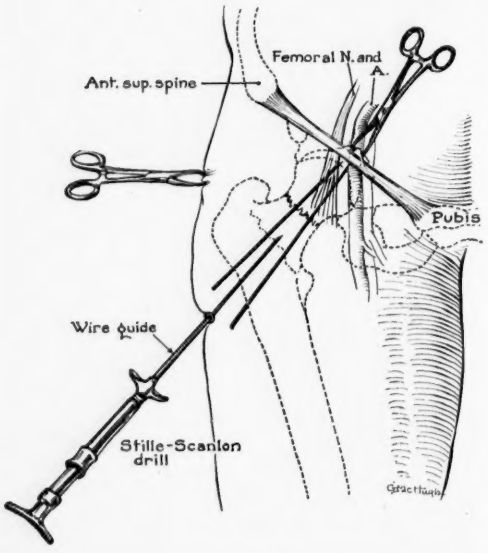

Fig. 2. Illustration of anatomical landmarks and method of insertion of the threaded steel wires.

that they enter the cortex of the femur at points forming a triangle or quadrangle. An attempt is made to crisscross the wires in transit through the neck (Fig. 2). A final roentgenogram is made and the wires are adjusted as indicated.

The skin is now depressed as much as possible and the wires are cut with a heavy, double-action shear. The skin is permitted to retract, leaving the ends of the wires buried from one to two inches below the cutaneous surface. No external immobilization is necessary. The patient may be returned to her bed, with a sand bag placed on either side of the foot until she has fully recovered from the anesthetic. It is advisable to immediately elevate the head of the bed, and if there are no evidences of shock, the patient may be permitted to sit in a wheelchair on the afternoon of the day of operation. These patients may be encouraged to stand with crutches and to begin to walk with the assistance of a nurse two days after reduction. A moderate amount of soreness from the insertion of the wires may be present for from seven to 10 days. We recommend that weight-bearing be avoided for at least six months.

REPORT OF CASE

W. T., male, aged 32 years, was the first patient to be treated for fracture of the neck of the femur by means of internal fixation with threaded steel wires, without the use of plaster cast or brace. He was brought to the University of Chicago Clinics on October 21, 1936, following an automobile accident in which he sustained multiple fractures, including the pelvis, maxilla, the nose, the right wrist, and the neck of the right femur.

This patient did not have sufficient financial resources to pay for a prolonged period of hospitalization. In an institution such as the University of Chicago Clinics, which has a limited endowment, the few teaching beds available may not be assigned for many months to any one patient.

Threaded steel wires had been used by us, instead of the smooth Kirschner wire, for skeletal traction. We had found that these wires not only obtained a firm attachment to the bone in which they were inserted, but did not become loosened subsequently. Accordingly, it was decided to attempt to reduce and pin this fracture with the threaded wires. A technic similar to that described by Austin Moore was followed. On October 27, 1936, six days after the fracture occurred, the hip was reduced, using local anesthetic, and four threaded steel pins were inserted through the intact skin without making an incision. A small hand drill with a chuck was used. The wires were so inserted that their courses crossed while traversing the femoral neck. The skin was depressed as far as possible and the wires cut off so that the ends would be buried deeply in the soft tissues. No plaster cast or splint was used (Fig. 3-A).

In spite of the fact that there were other multiple injuries, the patient was able to leave the hospital on November 12, 22 days after the fracture occurred and 16 days after internal fixation of the fracture of the neck of the femur. He returned to the Clinic on December 10, 1936, seven weeks after the fracture, walking on crutches. Union occurred promptly. There was no displacement, no angulation, and he returned to his work five months after the accident (Fig. 3-B). Nine months after reducing this fracture, the wires

A B

Fig. 3. *A.* Antero-posterior view following reduction and internal fixation with four threaded steel wires. *B.* Lateral view six and one-half months following closed reduction and blind pinning with threaded steel wires. Solid bony union. Patient had been at work with active weight-bearing for more than two months preceding roentgenogram.

were removed because the ends protruding from the shaft of the femur, just below the trochanter, caused mild irritation and discomfort in the soft parts. At the time of removing these wires, they were found to be quite firm in the bone. As far as could be determined there was no absorption of bone about them.

Sixteen months after the automobile accident referred to above, this patient fell from a height of about 20 feet. He struck on his lower back and right side. Examination revealed a compression fracture of the twelfth thoracic and the second lumbar vertebræ and multiple contusions. Although he stated that much of the force of the fall was directed against the previously injured hip, it was not re-fractured.

Because of the satisfactory result in the above case, all recent fractures of the intracapsular portion of the neck of the femur, which have been treated under my supervision during the past four years, have been managed in a similar manner. Patients of other surgeons in the University of Chicago Clinics, including those of Dr. Phemister and Dr. Hatcher, also have been treated by fixation with threaded steel wires.

The series is small and the time is yet too short to report an end-result study. The results thus far, however, have been imminently satisfactory (Fig. 4). In the 10 cases which I have personally treated, there have been no deaths, no non-unions, no aseptic necroses of the femoral head, no complications, and only two instances of delayed union.

As has been so well shown by Selig, smooth pins, such as Kirschner wires, afford unsatisfactory immobilization because they lack the ability to grasp the bony trabeculæ which is possessed by the threaded wires. As occurred in one of my cases, they may migrate to the surface, causing irritation of the skin and necessitate removal before the fracture has united.

DISCUSSION

The advantages of internal fixation of recent fractures of the neck of the femur were first suggested by von Langenbeck, and the successful application of a method

A B C

Fig. 4. *A.* Roentgenogram patient aged 63, one week after closed reduction and insertion of four threaded steel pins without incision. *B.* Antero-posterior view eleven months after closed reduction and internal fixation with steel wires. *C.* Lateral view showing healing in normal position.

of nailing a fracture of the neck of the femur was reported by Koenig in 1878, while a series of thirteen successful cases similarly spiked, with a three-cornered nail driven directly through the skin and followed with a plaster cast immobilization, was reported by Nicolaysen.

The current widespread interest in methods of internal fixation of fractures of the femoral neck may be directly attributed to the enthusiasm aroused by the reports of Smith-Petersen and his colleagues of the success attained by the use of a three-flanged nail. Modifications of methods of treating fractures of the neck of the femur during the past nine years have been principally concerned with variations in the types of pins, nails, screws, or wires used, and in the methods of their introduction. Henderson, Thomas, Johansson, Knowles, Wescott, Moore, Telson and Ransohoff, Gaenslen, Albee, Cubbins and co-workers, Thornton and Sandison, and many others have reported their own particular variations in materials or technics.

Some of the authors advised open reduction and others were advocates of blind nailing after incising laterally to expose the femur at the level of the greater trochanter. With rare exceptions, in addition to the internal fixation advocated, these authors found it advisable, if not entirely necessary, to apply some type of plaster cast, although the period and extent of plaster immobilization was usually less than that required by the old Whitman method. The three-flanged nail which was proposed and popularized by Smith-Petersen is still the most widely used method of internal fixation. The incidence of union from various methods of internal fixation of fractures of the intracapsular neck of the femur is greater than 80 per cent. However, I rejected the Smith-Petersen nail as my method of choice because:

1. Insertion of the nail required an open

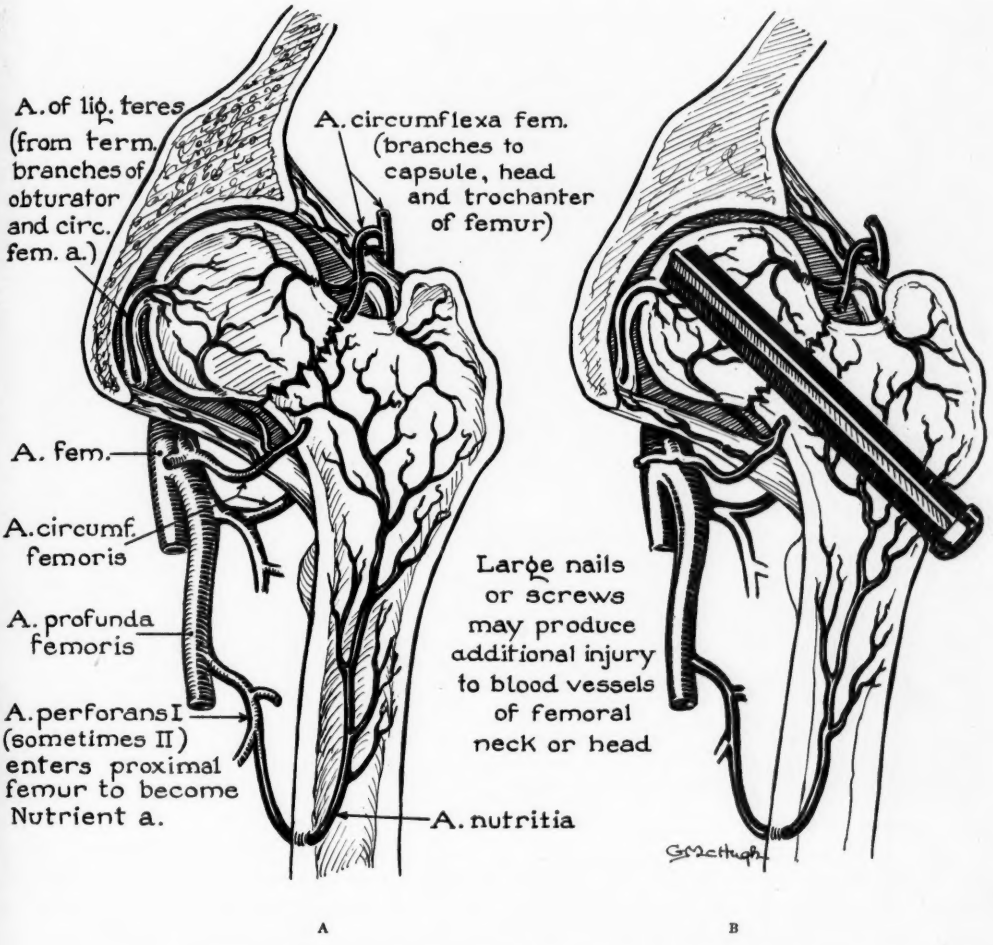
A. of lig. teres (from term. branches of obturator and circ. fem. a.)
A. circumflexa fem. (branches to capsule, head and trochanter of femur)
A. fem.
A. circumf. femoris
A. profunda femoris
A. perforans I (sometimes II) enters proximal femur to become Nutrient a.
A. nutritia
Large nails or screws may produce additional injury to blood vessels of femoral neck or head
A
B

Fig. 5. *A.* Illustration showing sources of blood supply to the head and neck of the femur. *B.* Illustration showing how the insertion of a two- or three-bladed nail or screw of large diameter may produce additional injury to the circulation of the femoral neck or head, leading to aseptic necrosis even though union does occur.

operative procedure.

2. Theoretically, at least, it constituted a threat to intact nutrient arteries in the femoral neck or head (Fig. 5-A).

3. The continued presence in the central portion of the femoral neck and head of a three-bladed chisel may retard revascularization of the partially devitalized bone (Fig. 5-B).

4. Aseptic necrosis (Axhausen, Phemister, Santos) may follow insertion of the nail, even though union of the fracture takes place (Fig. 6).

5. Too often the nail alone does not af-

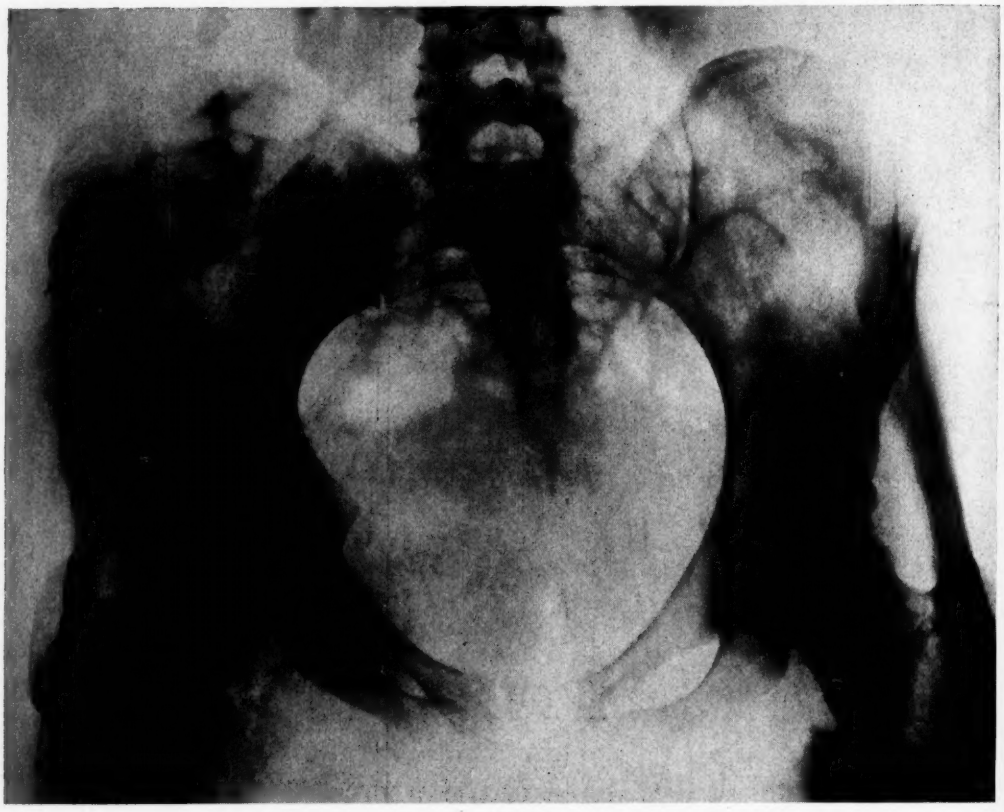

Fig. 6. Roentgenogram showing united fracture of the neck of the femur. Eight weeks after closed reduction and cast, the femoral head, as judged by the roentgenogram, was viable, but union had not occurred. Open reduction and fixation with the Smith-Petersen nail was then carried out. The fracture united, but aseptic necrosis of the head of the femur resulted. (Courtesy of Dr. D. B. Phemister.)

ford sufficiently secure fixation of the fracture to permit early ambulation without first applying a plaster cast for additional support.

In recapitulation, it is perhaps permissible for me to list some factors which may favorably influence union of recent intracapsular fractures of the neck of the femur, with subsequent physiologic function in the extremity.

1. Early reduction after the fracture injury.

2. Accurate reduction, as demonstrated in both anterio-posterior and lateral roentgenograms.

3. Creation of a position of valgus (Pauwels) to eliminate shearing force.

4. Internal fixation by a method least likely to injure nutrient blood vessels or to prevent revascularization.

5. Early mobilization with passive and active motion in all joints of the extremity.

6. Delayed weight-bearing for at least

six months, to permit the maximum degree of revascularization of the femoral head.

Advantages of the ambulatory treatment of recent fractures of the neck of the femur, following closed reduction and threaded wire fixation are:

1. The incidence of hypostatic pneumonia in elderly individuals may be reduced.

2. The patient may sit upright in bed or in a wheelchair immediately after closed reduction and internal fixation by this method.

3. The patient may become ambulatory, if not too feeble, on the second or third day following reduction.

4. Hospitalization may be shortened to from four to seven days.

5. The method is relatively atraumatic.

6. Immediate and accurate reduction, adequate immobilization of the fracture, with early mobilization of the various joints of the extremity, are factors which may reduce the incidence of aseptic necrosis.

7. Circulation of blood and lymph in the injured limb, with improved muscle tone and tissue turgor in the entire body, is enhanced by physical activity and is desirable provided this does not endanger the immobilization of the fracture itself.

8. The small threaded wires neither endanger to any appreciable extent surviving branches of the nutrient arteries of the femoral neck or head, nor do they obstruct attempts at revascularization.

9. The incidence of union in our own experience has been infinitely better than by any other method which has been tried in this Clinic. The patient is spared the unpleasant experience and often serious results of long plaster cast immobilization.

10. Atrophy of disuse of bones and muscles does not occur to any appreciable extent when this method is carried out.

11. Reduction of the period of hospitalization from several months to a few days greatly decreases the economic strain upon the patient and works to the advantage of the surgeon, who, too often, is deprived of a fee because the patient's financial resources are more than exhausted by the requirements of the hospital alone.

This method, in combination with tibial bone grafts, has been successfully applied in the treatment of old ununited intracapsular fractures of the neck of the femur (Compere and Lee).

SUMMARY

Recognition of the fact that accurate internal fixation will result in union of at least 80 per cent of fractures of the neck of the femur has greatly improved the prognosis in injuries of this type.

There is some evidence that large flange nails, which occupy a considerable portion of the diameter of the femoral neck, may result in further injury to the circulation or interfere with revascularization of the femoral head.

In this paper I have demonstrated the use of threaded, stainless steel wires of a diameter so small that blood vessels are not greatly endangered, nor is revascularization obstructed. This method has been quite successful in a small series of cases. For the surgeon who is trained in mechanical methods and who understands orthopedic principles, it is entirely safe. No cast is required and the wires can be inserted with a hand drill without making any incision, with the use of either local or general anesthesia. The period of hospitalization has been shortened to an average of about ten days and the period of recumbency in bed to from twenty-four hours to six days. The holding power of the wires has been shown to be as great as that of any of the other more commonly used larger pins or nails.

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RÉSUMÉ

Traitement ambulatoire des fractures nouvelles

La reconaissence du fait que correcte fixation interne a comme résultat l'union dans 80% au moins des fractures du cou fémoral, a énormement amélioré le pronostic dans lésions de cette sorte.

Il semble que des clous avec de pas gros rebord qui occupent une partie considerable du diamètre du cou fémorale peuvent résulter en ulterieurs dommages pour la circulation ou peuvent déranger la révascularization de la tête fémorale.

Dans cet ouvrage j'ai démontré l'usage de fils d'acier à trousse inoxidables d'un diamètre si petit que les vaisseaux sanguins ne sont pas beaucoup exposés au danger ni la vascularization est obstruite. Cette méthode a eu bon succès dans une petite série de cas. Pour le chirurgien qui est trainé avec les méthodes mechaniques et qui sait les principles de l'ortopedie, cette méthode est très sure. Pas de moule est necessaire et les fils peuvent être insérés avec une machine à forer à main sans faire aucune incision, en employant anesthesie locale ou generale. La période de hospitalization a été réduite à une moyenne de presque 10 jours et la période de repos à lit de 24 heures à 6 jours. Les fils sont capables de fixer autant que tout autre moyen plus communement employé, comme épingles ou clous plus grands.

ZUSAMMENFASSUNG

Die ambulatorische Behandlung von frischen Brüchen

Die Erkenntniss der Tatsache, dass genaue innere Fixation, in mindestens 80% der Fälle eines Schenkelhalsbruches, eine Vereinigung zur Folge hat, hat die Prognose derartiger Verletzungen bedeutend verbessert.

Es sind einige Beweise welche dafür sprechen, dass lange Flanschnägel, welche einen beträchtlichen Teil des Durchmessers des Schenkelhalses einnehmen, weitere Schädigungen der Circulation zur Folge haben, und die Gefässneubildung im Kopf des Femur beeinträchtigen.

In diesem Artikel habe ich auf den Gebrauch von fadenförmigen Drähten aus nichtrostendem Stahl hingeweisen, deren Durchmesser so klein ist, dass weder Blutgefässe sehr gefährdet sind, noch die Gefässneubildung gehindert ist. Diese Methode war in einer kleinen Anzahl von Fällen ziemlich erfolgreich. Es ist ein vollkommen sicheres Verfahren, für den Chirurgen der in mechanischen Methoden ausgebildet ist und der die orthopädischen Principien beherrscht. Ein Gipsverband ist nicht nötig und die Drähte können ohne Incision unter lokaler oder allgemeiner Anesthesie, mit einem Handbohrer eingeführt werden. Der Spitalsaufenthalt w u r d e durchschnittlich auf zehn Tage und die Bettruhe auf eine Dauer von zwischen vierundzwanzig Stunden und sechs Tagen, verkürzt. Die Widerstandskraft der Drähte erwies sich als die gleiche, wie die der mehr allgemain verwendeten grösseren Nadeln und Nägeln.

RESUMEN

Tratamiento ambulatorio de fracturas recientes

Reconocimiento que fijación interna exacta resultará en unión en los 80 por ciento de los casos de fractura del cuello del femur ha mejorado mucho el pronóstico en daños de este tipo.

Hay evidencia que los clavos grandes que ocupan una parte considerable del diámetro del cuello femoral pueden resultar en daño adicional a la circulación o pueden interrumpir la revascularización de la cabeza del femur.

En el presente papel, he demostrado el empelo de hilo de acero de diametro tan pequeño que los vasos no encuentran peligro, ni tampoco se obstruye la revascularización. El dicho método ha tenido bastante éxito en una serie limitada de casos. Para el cirujano que está bien instruído en metodos mecánicos y que entiende bien los principios ortopédicos, es completamente seguro y sin peligro. No es preciso emplear un forma de estuco y los hilos pueden insertarse empleando taladro de mano sin hacer ninguna incisión, con anestesia local o general. El tiempo de hospitalización ha sido reducido a un por medio de diez dias, y el tiempo de reclinación en cama a un rato de desde veinticuatro horas a seis dias. La fuerza agarradora de los hilos es tan grande como la de los clavos o alfileres mas grandes, de uso ordinario.

RIASSUNTO

Trattamento ambulatorio delle fratture recenti

Il riconoscimento del fatto che accurata fissazione interna ha come risultato l'unione in almeno 80% delle fratture del collo del femore, ha enormemente migliorata la prognosi di lesioni di questo genere. E possibile che chiodi a non larga capocchia che occupino una parte considerevole del diametro del collo femorale possano risultare in ulteriore danno alla circolazione o possano in-

terferire con la rivascolarizzazione della testa del femore.

In questo lavore ho dimostrato l'uso di fili a treccia di acciaio inossidabile di un diametro così piccolo che i vasi sanguigni non sono molto danneggiati nè la vascolarizzazione è ostruita. Questo metodo ha avuto successo in una piccola serie di casi. Per il chirurgo che è allenato ai metodi meccanici e che è al corrente dei principi di ortopedia, esso è del tutto sicuro. Nessun' ingessatura è necessaria e i fili possono essere inseriti con un trapano a mano senza fare alcuna incisione, con l'uso di anestesia locale o generale. Il periodo di ospitalizzazione e stato ridotto a una media di circa 10 giorni e il periodo di riposo a letto da 24 ore a 6 giorni. I fili sono capaci di fissare altr ettanto bene quanto qualsiasi altro mezzo più comunamente usato, come spilli o chiodi più grandi.

INTERNATIONAL ASSEMBLY

The next International Assembly of the International College of Surgeons will be held in August, 1941, in Mexico City, Mexico. Members of the United States Chapter may write to Dr. Desiderio Román, President Elect, 270 South Seventeenth Street, Philadelphia, Pennsylvania, for information.

The Treatment of Old Ununited Infected Fractures

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OLD ununited infected fractures are sequelæ of compound fractures, of the operative treatment of simple fractures, and of pathologic fractures occurring in osteomyelitic bones. Occasionally they are the result of a too determined effort on the part of the surgeon to save an extremity that might better have been sacrificed in the beginning. More frequently they are the result of (1) faulty treatment, due to inadequate or improper surgery combined with lack of proper approximation and fixation of the fragments; or (2) a severe infection which, in spite of satisfactory treatment, produced osteomyelitis, sequestration, and loss of bone substance with resultant non-union. In this latter group, the compound comminuted fracture is the chief offender.

The treatment of ununited infected fractures presents a triple challenge to the surgeon. First, how to splint and adequately fix the fracture in the presence of the infection. Second, the treatment of the infection itself, and third, how best to secure union. It has been our practice in the past to follow a conservative method of treatment, attacking one of these problems at a time. We have considered treatment of the old infected ununited fracture to be clearly divided into three stages:

1. Treatment of the infection.
2. A period of waiting to avoid recurrence of infection.
3. Treatment of non-union.

Stage I.—Treatment of the infection in old infected, ununited fractures is essentially the treatment of a localized osteomyelitis of the fragment ends, associated frequently with soft tissue abscess formation. The fundamental principles of the treatment are the removal of sequestra and adequate drainage of the abscess pockets. Fixation of the part is necessary, either on splints with provision for chemical irrigation of the wound, or by the more common method at the present day of vaseline packs and plaster fixation. Occasionally by following this method of treatment of the infected ununited fracture, the infection has healed with bony union of the fracture. More frequently, however, the treatment resulted only in clearing up of the infection and healing of the wound, which are the primary aims of this phase of therapy.

Stage II.—Because of the experiences in the First World War, a period of delay of at least six months after complete soft tissue healing of such an infected ununited fracture has been the practice before any operative procedure to obtain union. This dictum has seemed sound and was followed in our early cases, extending the delay period in 50 per cent of our cases to one year with no seeming benefit. Skin grafts to cover epithelialized areas have sometimes been performed during this stage.

Stage III.—After the period of delay to make sure infection was not apt to recur, various operative procedures to obtain union have been utilized. These consisted principally of freshening the bone ends with approximation and fixation, either internally at the fracture site or with pins through the fragments. More rarely bone grafts were used.

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It has been recognized that radical surgery with excision of the osteomyelitic areas, freshening of the bone ends, and internal fixation of the fracture might result in more frequent and earlier union. However, the fear of extending infection from a localized osteomyelitis to a generalized process has perpetuated the conservative treatment outlined above.

For the past five years we have slowly but increasingly deviated from the conservative therapy to what seemed to us a more radical procedure. Sherman, Orr and, more recently, Campbell, have advocated resection of the local osteomyelitic bone, with internal fixation of the fracture by plates or pins. They have packed the wound wide open and applied splints or plaster for external fixation. Stimulated by their work, we have followed their teachings against our surgical judgment. The fundamental principle, which is of greatest importance in this radical procedure, is the satisfactory drainage of all abscess cavities and assurance of continued draining by packing the wound wide open. Following this principle, we have been amazed at the impunity with which one can operate upon these infected fractures, resect the osteomyelitic areas, freshen the bone ends, and maintain approximation by internal fixation.

In the past five years we have treated 25 cases of infected ununited fracture by this more radical one-stage method. In none of these cases have we yet had the courage to use plates as internal fixative agents, but we feel that the experiences of Sherman and, more lately, of Campbell demonstrate the feasibility of this type of fixation. Their reports make their technic seem an added possibility for better fixation and more certain union than that obtained with the Smith bone clamp or wire fixation. We have also applied this same principle to pathologic fractures of osteomyelitic bones in several cases, but we are not reporting these results as we wish to confine this paper entirely to ununited infected fractures.

These patients had all been ill for at least several months and so were in the chronic stage of their infection. For this reason, they showed variable evidence of general debility, marked loss of weight associated with a subnormal appetite and dehydration. The hemoglobin was almost constantly reduced. The local lesions in these patients presented either draining sinuses or wide open infected wounds. The fracture fragments frequently protruded through the skin and lay in a bed of infected granulation tissue. The surrounding skin was commonly irritated and macerated by prolonged exposure to the drainage. Generally, there were undrained soft tissue abscesses surrounding the fracture. If these abscesses were large there was considerable fever. Previous long splinting had caused fixation of adjacent joints, and pressure from this fixation, with long periods in bed, had resulted in decubiti over the bony prominences. Palsies from pressure over superficial nerves were not uncommon.

X-ray examination of the extremity usually showed malposition and malalignment of the fragments. The bone ends showed either atrophic non-union with rounding and absorption of the lime salts, in which case there was separation of the fragments with soft tissue interposition, or the non-union was of the sclerotic type, with severely increased X-ray opacity and with the fragments in contact. Multiple sequestra were the rule and they were found between the fragments, or beside one of the fragments, in which case they were frequently due to non-viable comminuted pieces from the original fracture. Frequently, the sequestra were located within the cortex of one fragment, and were due to the osteomyelitic process. Osteomyelitis of the fragments was further demonstrated by irregular areas of bone absorption interspersed with evidence of bone regeneration. There was usually periosteal reaction about the bony cortex adjacent to the fracture site.

The general treatment of the patient was given first consideration. It was our custom to give fluids, transfusions and other supportive medications before any surgery other than the emergency drainage of abscesses was carried out. In the more recent cases, sulfanilamide was given orally before operation and implanted locally at the operative procedure. With the application of these supportive measures, the general condition of the patient became satisfactory comparatively quickly in most cases and, when this had been accomplished, the active treatment of the fracture was instituted.

Under general anesthesia the fracture sites were exposed with an incision usually excising the sinus tract. Small abscesses about the fragments were drained. Sequestra lying outside the bony cortices were removed. Scar tissue between the fragment ends was excised and the fragments were resected until fresh bleeding bone was obtained. If gross osteomyelitis was present, the fragments were saucerized to obtain drainage and to remove sequestra from within the cortex. After this was accomplished, the fragments were properly aligned and placed in contact. Internal fixation was used when it appeared necessary to maintain approximation and gave no apparent difficulty. In any event, the wound was widely packed open with vaseline gauze, with no attempt at closure. Ample dressings were applied, followed by a cast immobilizing the joints adjacent to the fracture. The wound was thus treated as an osteomyelitis by the method long advocated by Orr.

Culture of material removed at these operations showed staphylococcus aureus to be the usual organism. Streptococcus hemolyticus and *B. welchii* each were found in one case in this series. *B. coli* was frequently found along with one of the above. In no case was a positive blood culture obtained following operation, although in a few cases septicemia was suspected and cultures were taken. Usually, however, the procedure was carried out without consequent serious reaction. A study of the temperature charts showed that there was commonly less fever three or four days after the operation than preoperatively. In no case was there prolonged severe elevation of temperature and there were no mortalities.

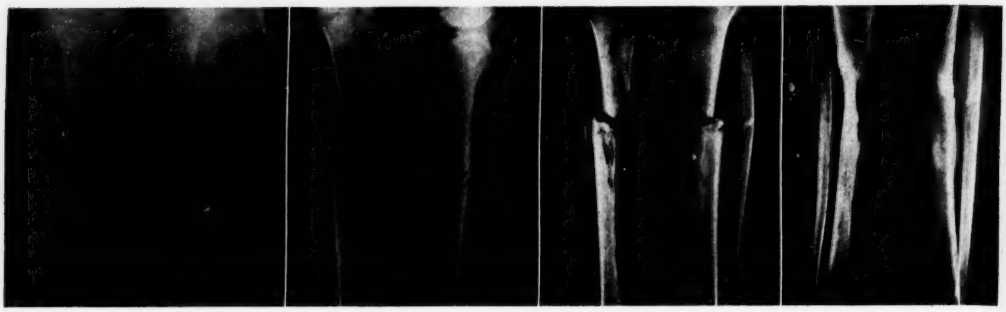
After this primary operative procedure, transfusions and other generalized sustaining treatment were carried out as indicated. The dressings and cast were changed at intervals which averaged about once per month. Attention was always given to keeping the wound widely packed open. Careful fixation in plaster was maintained. If internal fixation was used it was removed when the fragments became fixed by callus and before the operative wound was allowed to heal. Frequently X-ray examinations were made with the cast removed, and when further sequestra arose they were removed. If further abscesses developed, they were drained.

CASE REPORTS

The following group of brief case reports, together with roentgenograms of each case, is presented as illustrative of this series.

We have not followed strictly what we have described as the one-stage method in all cases, and in Cases 1 and 3 of this selected group, the three-stage method was more nearly used with excellent results. The remainder were treated by the more radical one-stage method, with failure of union in Cases 8 and 9, and with deformity in Case 6.

CASE 1.—J. B., a man, aged 25, was in an automobile accident January 7, 1938, sustaining a compound fracture of the right tibia and fibula at the junction of the upper and middle thirds. Immediate reduction was done without debridement and a cast was applied. He was admitted to the hospital on January 18, 1938, with

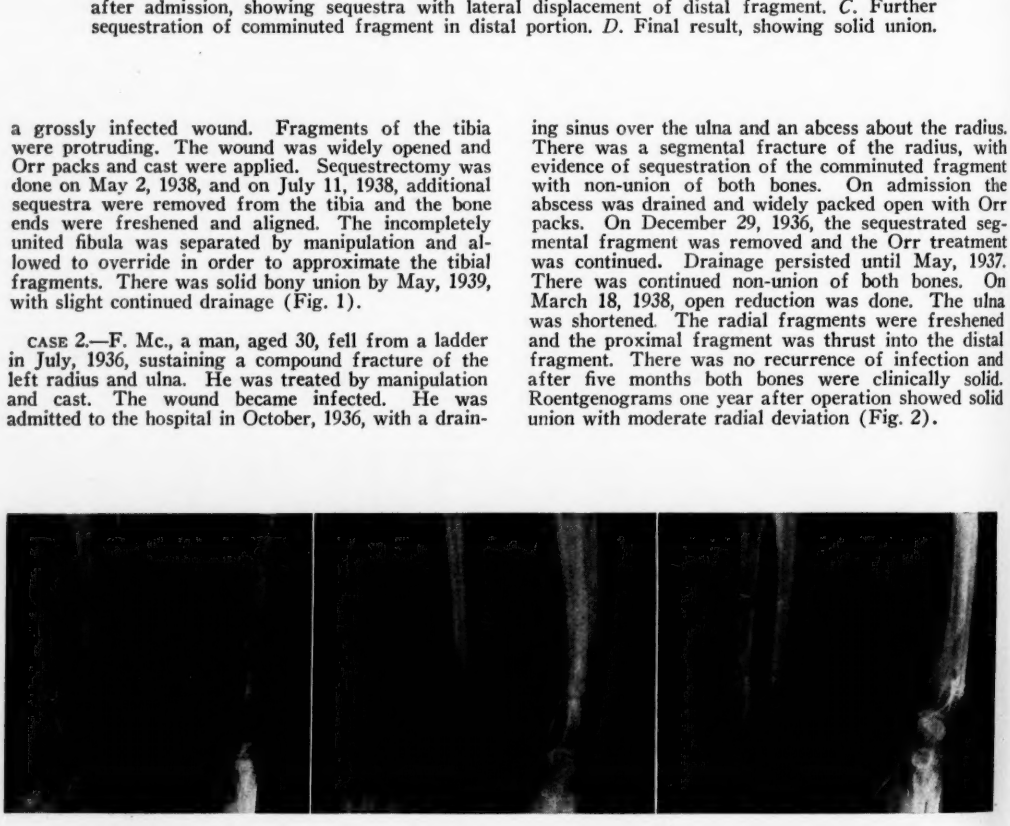


A B C D

Fig. 1—Case 1. *A*. Roentgenogram taken on admission of patient, showing fracture of right tibia and fibula. Dakin tubes had been inserted for irrigation before admission. *B*. Two months after admission, showing sequestra with lateral displacement of distal fragment. *C*. Further sequestration of comminuted fragment in distal portion. *D*. Final result, showing solid union.

a grossly infected wound. Fragments of the tibia were protruding. The wound was widely opened and Orr packs and cast were applied. Sequestrectomy was done on May 2, 1938, and on July 11, 1938, additional sequestra were removed from the tibia and the bone ends were freshened and aligned. The incompletely united fibula was separated by manipulation and allowed to override in order to approximate the tibial fragments. There was solid bony union by May, 1939, with slight continued drainage (Fig. 1).

CASE 2.—F. Mc., a man, aged 30, fell from a ladder in July, 1936, sustaining a compound fracture of the left radius and ulna. He was treated by manipulation and cast. The wound became infected. He was admitted to the hospital in October, 1936, with a draining sinus over the ulna and an abcess about the radius. There was a segmental fracture of the radius, with evidence of sequestration of the comminuted fragment with non-union of both bones. On admission the abscess was drained and widely packed open with Orr packs. On December 29, 1936, the sequestrated segmental fragment was removed and the Orr treatment was continued. Drainage persisted until May, 1937. There was continued non-union of both bones. On March 18, 1938, open reduction was done. The ulna was shortened. The radial fragments were freshened and the proximal fragment was thrust into the distal fragment. There was no recurrence of infection and after five months both bones were clinically solid. Roentgenograms one year after operation showed solid union with moderate radial deviation (Fig. 2).



A B C

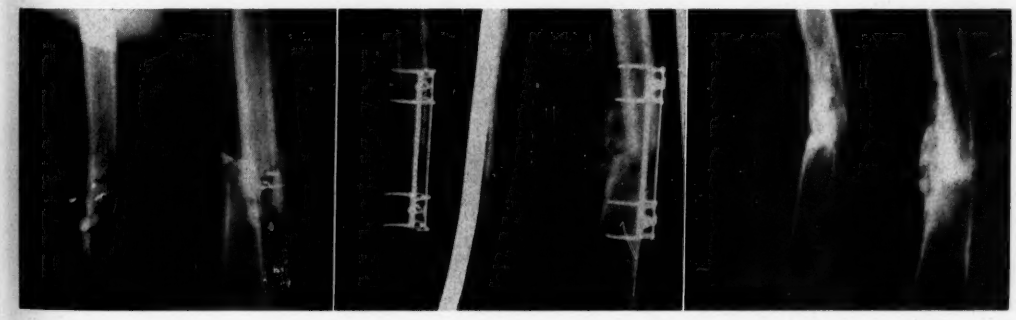
Fig. 2—Case 2. *A*. Roentgenogram taken on admission of patient, showing non-union of both bones and non-viable segmented fragment of the radius. *B*. Roentgenogram showing sequestrum removed with soft tissues healed, but lack of contact of radius with non-union of both bones. *C*. Final result after shortening of ulna and thrusting of proximal radial fragment into distal fragment, with moderate radial deviation.

A B C

Fig. 3—Case 3. *A*. Roentgenogram taken on admission of patient, showing non-union of the tibia with multiple sequestra, and vaseline gauze pack in wound. *B*. Roentgenogram after freshening of tibia, application of graft, and hiatus filled with bone chips. *C*. Final result, showing bony union.

CASE 3.—P. P., a man, aged 19, was in a motorcycle accident on May 16, 1932, sustaining a compound fracture of the right tibia and fibula at the lower and middle thirds. The wound was debrided and a bone plate was applied. Infection followed. The plate was removed and sequestrectomy was done in October, 1932. He was admitted to the hospital on October 21, 1932. There was non-union of the tibia, with an infected wound over its medial side. Two days after admission sequestrectomy was done and the tibia was aligned. Union of the fibula prevented close approximation of the fragments. By May, 1933, drainage had almost stopped and there was an incomplete fibrous union. The patient was given a leather cone with a walking caliper. He failed to return until February, 1936. The soft tissues were then healed but there was non-union of the tibia. The scar was excised and a skin graft was done. On April 18, 1936, the tibial fragments were freshened and a thrust type of graft was applied. The hiatus between the tibial fragments was filled with bone chips and the fibula was not osteotomized. Mild infection recurred, causing the removal of a portion of the graft. Solid bony union was present by March 1, 1937, but slight drainage continued until August, 1938 (Fig. 3).

CASE 4.—E. C., a man, aged 26, sustained a simple fracture of the left femur March 14, 1936. An open reduction was done the following day and a bone plate was applied. A fragment was also wired. Wound infection followed. On July 13, 1936, the incision was opened and the plate was removed. He was admitted to the hospital on August 10, 1936, with an ununited infected fracture. The fragments were overriding and contained multiple sequestra, as well as foreign material from previous internal fixation. On August 15, 1936, a sequestrectomy was done and the bone ends were freshened and aligned. Alignment still was not satisfactory and on August 27, 1936, the fragments were again approximated and a Smith bone clamp was applied. Orr packs and hip spica were used. The Smith clamp was removed January 14, 1937, at which time there was solid clinical union. Roentgenograms showed solid union with healed soft tissues in May, 1937 (Fig. 4).



A B C

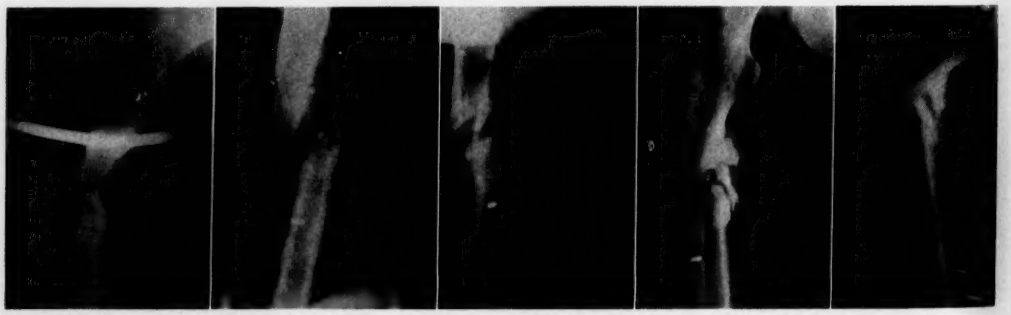
Fig. 4—Case 4. *A*. Roentgenogram taken on admission of patient, showing non-union of the femur with overriding of fragments, multiple sequestra and foreign material from previous internal fixation. *B*. Roentgenogram after sequestrectomy, freshening of fragment ends and application of Smith bone clamp. *C*. Final result, showing solid union with healed soft tissues.

A B C

Fig. 5—Case 5. *A*. Roentgenogram taken on admission of patient, showing comminuted segmental fracture of tibia, non-union with sequestration of comminuted fragments. The fibula is healed. *B*. Roentgenogram taken after removal of sequestra, but there is a large viable fragment partially bridging the fracture which has been left in place. *C*. End-result, showing solid union.

CASE 5.—F. C., a man, aged 39, was in an automobile accident in October, 1936, suffering compound fractures of the left tibia and fibula. He was treated with skeletal traction for four months and then with a cast. Infection of the compound wound occurred. He was admitted to the hospital on July 16, 1937, with an ununited comminuted segmental fracture of the left tibia in the middle third and sequestration of the comminuted fragments. There was union of the fibula with draining sinuses over the tibia. On July 22, 1937, a sequestrectomy was done, but a large comminuted viable fragment was left partially bridging the fractured tibia. The tibial fragments were freshened but the fibula was not refractured. Orr packs and a cast were applied. By December, 1937, there was evidence of clinical union. A small sequestrum was removed in April, 1938, and by June, 1938, roentgenograms revealed solid union and the soft tissues were healed. The patient was walking with a brace (Fig. 5).

CASE 6.—N. W., a man, aged 25, was in an automobile accident May 13, 1933, sustaining a simple fracture of the right femur. He was treated with traction, cast, and finally by open reduction and the application of a bone plate on July 1, 1933. The operative wound became infected and the plate was removed August 18, 1933. He was admitted to the hospital on August 26, 1933. There were three draining sinuses in the operative scar. There were abscesses of the soft tissues, with non-union of the femur and sequestration of the fragmented ends. On August 31, 1933, incision and drainage of the abscesses and removal of sequestra from between the fragments were done. The wound was packed open with Orr packs and a spica was applied. This was followed by a change of dressings and cast at about six-week intervals for the next twelve months. An additional sequestrum was removed in September, 1934. The femur was then clinically solid. Plaster fixation was continued until January, 1936, when there was also solid union, as shown by roentgenograms. The soft tissues were healed. There was marked lateral bowing at the fracture site (Fig. 6).



A B C D E

Fig. 6—Case 6. *A*. Roentgenogram taken on admission of patient, showing non-union with sequestration of fragment ends. Note screw from previous plate. *B*. Fixation in cast with loss of position. *C*. Improved position with early fibrous union. D. Incomplete union eleven months after admission, with formation of sequestrum. *E*. Final result, showing solid union with severe lateral bowing.

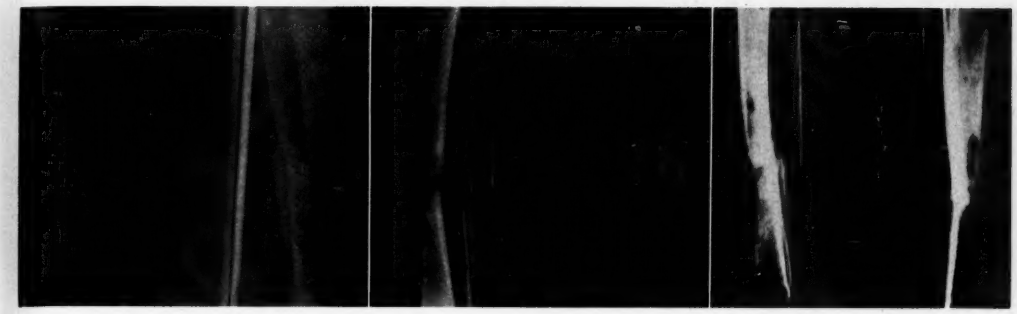


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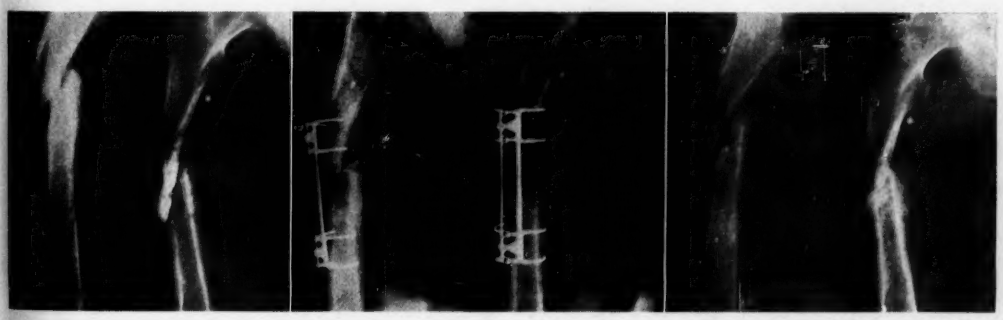
Fig. 7—Case 7. *A*. Roentgenogram taken on admission of patient, showing non-union with medial bowing of the tibia and proximal fragment protruding from the soft tissues. *B*. Roentgenogram after freshening and aligning bone fragments and fixation in cast. *C*. Final result, showing solid bony union.

CASE 7.—W. B., a man, aged 29, was in an automobile accident in December, 1937, sustaining a simple fracture of the left tibia and a comminuted fracture of the left fibula. He was treated with a cast for six weeks and then had an open reduction of the tibia and a bone plate was applied. There was severe infection of the operative wound and the plate was removed six weeks later. He was admitted to the hospital on March 7, 1938, with non-union and with the proximal tibial fragment protruding outside the soft tissues. On the day after admission, the granulation tissue was removed from between the bone ends and the ends were freshened and aligned. The sequestra were removed. Orr packs and a cast were applied. Repeated dressings and casts were applied as needed. There was solid union by January, 1939, but the soft tissues were not completely healed until May, 1939 (Fig. 7).

CASE 8.—W. A., a man, aged 38, sustained a simple fracture of the right femur in April, 1937, when a tractor upset. He was treated by open reduction and bone plate. The wound became infected. In January, 1938, the plate was removed and the wound packed open. He was admitted to the hospital on June 23, 1938. There was profuse drainage. The fragments of the femur were protruding from the open wound and were separated by granulation tissue. On June 27, 1938, sequestra were removed from the bone ends, the bone ends were freshened, aligned, and fixed in position with a Smith bone clamp. Orr dressings and a cast were applied. On September 14, 1938, the Smith bone clamp was removed and the Orr treatment was continued. Although the soft tissues were healed by April, 1939, bony union failed to be obtained. The patient has been advised to return for a bone graft, but has not done so to date (Fig. 8).



A B C

Fig. 8—Case 8. *A*. Roentgenogram taken on admission of patient, showing non-union with overriding of fragments and the proximal fragment protruding outside the soft tissues. *B*. Roentgenogram after freshening fragments, alignment and fixation with Smith bone clamp. *C*. Final result, showing atrophic non-union with healed soft tissues.

Chart 1. 25 Cases of Ununited Infected Fracture

INITIALS	AGE	ORIGINAL INJURY	ORIGINAL TREATMENT OF FRACTURE	TIME BEFORE ADMISSION	TREATMENT OF INFECTED FRACTURE	RECONSTRUCTIVE SURGERY	FINAL OUTCOME	TIME FROM ADMISSION TO UNION
J. B. Case 1	25	Compound fracture right tibia and fibula.	Manipulation and cast without debridement.	11 days	Open alignment of fragments. Later sequestrectomy with freshening of fragments.	None	Solid union. Slight persistent drainage.	16 months
F. Mc. Case 2	30	Compound fracture left radius and ulna. Segmentation radius.	Manipulation and cast.	3 months	Incision and drainage of abscess. Later removal of sequestrated segment.	Ulna shortened. Proximal radial fragment freshened and thrust into distal fragment.	Solid union. Healed soft tissues.	22 months
P. P. Case 3	19	Compound fracture right tibia and fibula.	Debridement. Application of bone plate to tibia.	5 months	Sequestrectomy with alignment of fragments. Healed fibula prevented contact of tibia.	Thrust type of bone graft. Hiatus filled with chips.	Solid union. Healed soft tissues.	53 months
E. C. Case 4	26	Simple fracture left femur.	Open reduction and bone plate. Infected operative wound.	5 months	Sequestrectomy. Bone ends freshened and aligned. Smith bone clamp.	None	Solid union. Healed soft tissues.	9 months
F. C. Case 5	39	Compound comminuted fracture left tibia. Fractured fibula.	Skeletal traction. Later placed in cast.	9 months	Sequestrectomy. Bone fragments freshened	None	Solid union. Healed soft tissues.	11 months
N. W. Case 6	25	Simple fracture right femur.	Traction and cast. Later open reduction and bone plate. Infection.	3 months	Incision and drainage of abscess. Sequestrectomy and freshening of fragments.	None	Solid union. Healed soft tissues.	29 months
W. B. Case 7	29	Simple fracture left tibia. Comminuted fracture fibula.	Open reduction and bone plate. Wound infection.	4 months	Sequestrectomy. Bone ends freshened and aligned.	None	Solid union. Healed soft tissues.	10 months
W. A. Case 8	38	Simple fracture right femur.	Open reduction and bone plate. Wound infection.	14 months	Sequestrectomy. Fragments freshened and aligned. Smith bone clamp.	To have open reduction and bone graft.	Non-union. Soft tissues healed after 8 months.	Non-union
F. N. Case 9	39	Simple supracondylar fracture left humerus.	Open reduction with wire internal fixation. Infected operative wound.	9 months	Drainage with removal wire. Fragments freshened later. Poor approximation.	Open reduction and onlay graft. Later fracture of graft. Repeat operation with infection.	Non-union with drainage after 36 months from admission.	Non-union
J. S. Case 10	12	Compound fracture left radius and ulna 3 inches above wrist.	Manipulation and cast. Incision and drainage of abscess.	6 weeks	Sequestrectomy ulna. Alignment of fragments.	None	Solid union in good position. Healed soft tissues.	3 months
R. R. Case 11	38	Compound fracture right radius and ulna.	Fixation in splint.	4 weeks	Incision and drainage of abscess. Sequestrectomy of lower radial fragment.	None	Non-union and continued drainage after 16 months.	Non-union
G. L. Case 12	52	Compound comminuted fracture of left tibia.	Fixation by skeletal traction. Removal of sequestrated fragment.	7 months	Sequestrectomies at three different times.	None	Solid union. Slight drainage after recent sequestrectomy.	9 months
M. F. Case 13	25	Compound fracture left tibia and fibula.	Debridement. Collins bone clamp. Wound closed.	1 month	Sequestrectomy. Removal of bone clamp. Later further sequestrectomy and freshening of bone ends.	None	Solid union. Healed soft tissues.	21 months

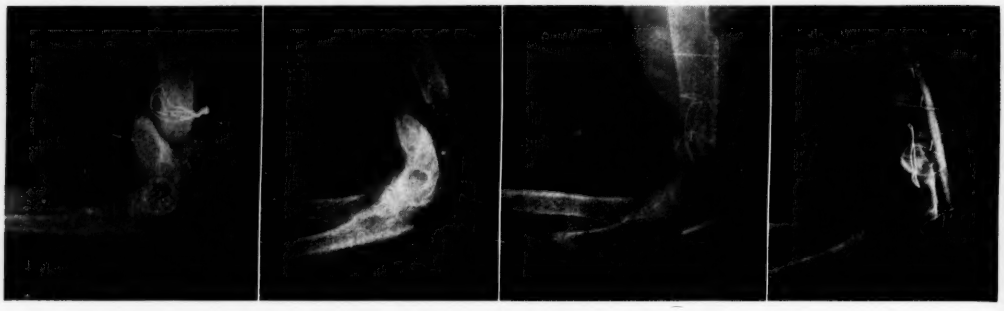
CHART I (Continued)

INITIALS	AGE	ORIGINAL INJURY	ORIGINAL TREATMENT	TIME BEFORE				

M. F. Case 13	25	Compound fracture left tibia and fibula.	Debridement. Collins bone clamp. Wound closed.	1 month	Excision of sclerotic bone. Sequestrectomy. Bone clamp. Later further sequestrectomy and freshening of bone ends.		Amputation 10 months after admission. Persistent infection and soft tissues.	

CHART I (Continued)

INITIALS	AGE	ORIGINAL INJURY	ORIGINAL TREATMENT OF FRACTURE	TIME BEFORE ADMISSION	TREATMENT OF INFECTED FRACTURE	RECONSTRUCTIVE SURGERY	FINAL OUTCOME	TIME FROM ADMISSION TO UNION
J. Mc. Case 14	18	Gunshot wound. Loss of substance of right radius.	Debridement. Fragments wired together. Infection.	6 weeks	Fixation in casts. Drainage stopped with failure of bony union.	Ulna shortened and graft applied to radius.	Solid union. No recurrence of infection.	12 months
A. A. Case 15	34	Compound fracture left ulna. Dislocated proximal head radius.	Debridement. Bone plate applied two weeks later. Infection.	15 months	Bone ends exposed and freshened.	Advised removal of head of radius. Did not return.	Clinical union. Healed soft tissues.	5 months
R. L. Case 16	33	Compound fracture left tibia.	Debridement. Sequestrectomy later but before admission.	10 months	Soft tissues healed with fixation in cast. Non-union of bone.	Bone graft 16 months after admission. Reinfection.	Healed soft tissues. No union of tibia.	Non-union
D. E. Case 17	61	Compound fracture lower third of left femur.	Debridement. Closure. Skeletal traction. Infection.	Admitted on day of fracture	Sequestrectomy. Bone ends freshened.	None	Clinically united after 7 months. Refracture with fall. Final non-union. Healed soft tissues.	Non-union
G. T. Case 18	47	Compound comminuted fracture of right humerus.	Debridement and fixation with skeletal traction. Infection.	2 days	Fragments freshened and step cut. Wire internal fixation.	None	Clinically solid. Soft tissues healed.	7 months
G. S. Case 19	12	Compound fracture right humerus.	Debridement and internal fixation with wire. Infection.	Admitted on day of fracture	Incision and drainage of abscess. Repeated Orr packs and casts.	Bone graft 6 months after infection subsided.	Solid union. No reinfection.	26 months
B. C. Case 20	48	Compound fracture of lower third of right tibia.	Debridement and closure of wound. Infection.	2 months	Sequestrectomy. Scar tissue removed from between fragment ends.	None	Solid union. Healed soft tissues.	12 months
M. K. Case 21	18	Simple fracture of right femur.	Open reduction and bone plate. Wound infection.	3 months	Plate removed. Sequestrectomy at two different times. Incision and drainage abscess thigh.	None	Solid union. Small recurrent draining sinus.	13 months
J. L. Case 22	32	Simple fracture of right tibia at upper and middle thirds.	Open reduction and bone plate. Non-union. Infection of wound at time of removal of plate.	46 months	Excision of pseudarthrosis. Sequestrectomy and freshening of ends of fragments.	Excision of sclerotic fragment ends. Osteotomy of fibula.	Non-union and persistent drainage 50 months after admission.	Non-union
E. B. Case 23	42	Compound fracture left tibia and fibula.	Bone plate without infection. Sliding graft later with wound infection.	30 months	Sequestrectomy. Curettement of scar from between ends of fragments.	Amputation at the request of patient.	Amputation 10 months after admission. Non-union with slight drainage.	
W. C. Case 24	37	Compound fracture of left tibia.	Open reduction and application of Parham band. Infection.	3 months	Sinuses explored. Parham band removed. Incision packed open.	None	Solid union without drainage.	6 months
C. H. Case 25	25	Compound fracture of left tibia and fibula.	Manipulation and cast.	6 months	Sequestrectomy. Removal of many fragments.	None	Solid union. Healed soft tissues.	5 months



A B C D

Fig. 9—Case 9. *A*. Roentgenogram taken on admission of patient, showing non-union, the wire failing to fix the distal fragment. *B*. Roentgenogram after removal of the wire and freshening of the fragments. Failure to use internal fixation resulted in loss of approximation. *C*. Approximation after first bone graft. *D*. Sequestration of graft and absorption of fragments following infection after second bone graft.

CASE 9.—F. N., a man, aged 39, sustained a simple supracondylar fracture of the left humerus on May 30, 1936. He was treated by manipulation and fixation in a cast and, finally, by open reduction and wiring of the fragments in December, 1936. The operative wound was infected. He was admitted to the hospital on July 7, 1937, with non-union and with a draining sinus posteriorly over the fracture site. The wire failed to fix the lower fragment which was overriding anteriorly. Two days later, the sinus was widely opened and the wire was removed. The wound was widely packed. The drainage persisted and on February 18, 1938, the fragments were exposed, freshened, and approximated. Packs were again applied. No internal fixation was applied and the approximation was lost. The drainage had stopped by July, 1938, and on January 17, 1939, the bone ends were again freshened and an onlay graft was applied. There was no recurrence of the infection. Union appeared to be beginning when the patient fractured the bone graft and non-union resulted. On January 19, 1940, open reduction with a bone graft was again done. Infection followed this operation. The graft sequestrated and has since been removed. The result is a continued non-union with drainage (Fig. 9).

A brief but comprehensive report of the outstanding features of the 25 cases of infected ununited fractures is presented in Chart I. It will be noted that four of these cases were admitted either immediately after injury or within a period up to eleven days afterward. Four more were admitted during the first six weeks. These cases are included because they went on to severe infection, delayed union, and necessitated the type of treatment under discussion. The remaining 17 cases were admitted after periods varying from two to forty-six months, and averaging ten months after injury.

Of the 25 cases, 18, or 72 per cent, were originally the result of compound fractures. Simple fractures, with infected operative wounds, were responsible for 7 cases, or 28 per cent. (See Chart I.)

A summation of the results of treatment is presented in Chart II.

CHART II

RESULTS OF TREATMENT

	CASES	PER CENT
Bony union	18	72
Bony union with healed soft tissues	15	60
Bony union with persistent drainage	3	12
Non-union with healed soft tissues	3	12
Non-union with persistent drainage	4	16
Amputation for persistent non-union and infection	1	4

The end-results of the treatment demonstrate the marked delay in obtaining union, the time period extending months beyond the usual time for union of the bones involved. The average period of healing in those cases obtaining bony union was fifteen months. If Case 3, who was out of our control for over two years during his period

of treatment, is not counted, the average is thirteen months.

CONCLUSIONS

Although it is recognized that the number of cases presented in this study is insufficient to draw any conclusions, they do serve to emphasize the principles long taught by Orr, namely, that the proper treatment of infection in bone is complete drainage, apposition, and complete fixation. As judged by these cases, there is no great danger in the opening of already infected wounds and cleaning away sequestra and debris between the fragments, as long as the wound is widely packed open following this procedure. However, if the infection appears active, radical surgery should, no doubt, be postponed until the infection has had time to subside. The fact that 28 per cent of these cases have come from infections incident to the operative reduction of simple fractures should again serve to remind us all that such treatment should be reserved for those fractures which will not yield to closed reduction. When open operation becomes necessary, it should be done only under the strictest aseptic technic. Finally, this report shows that 72 per cent of these patients obtained union under treatment as here advocated. Twelve per cent have obtained healing of soft tissues and will have a good chance at union by later bone graft procedures. On the other hand, the length of morbidity in this group of cases emphasizes the serious condition with which we are dealing.

SUMMARY

In the last five years, the authors have treated 25 cases of infected ununited fractures by resecting the osteomyelitic areas, freshening the bone ends, internal fixation when it appeared necessary to maintain approximation, and assuring continued drainage by packing the wound wide open. Fluids, transfusions and supportive medications are given, as indicated, before and after operation. Results in these cases have encouraged the authors to continue this method of treatment. Nine cases are reported in abstract form and 25 cases in a chart.

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RÉSUMÉ

Traitement des anciennes fractures infectées pas unies

Dans les cinq dernières années les auteurs ont traité 25 cas de fractures infectées pas unies, avec résection de la zone ostéomyélitique, liberation des extrémités de l'os, fixation interne lorsqu'il parait necessaire pour mantenir le rapprochement et continué drainage de la blessure largement ouverte. Liquides, transfusions et médicaments adaptés sont administrés selon indication avant et après l'operation. Les résultats obtenus dans ces cas ont encouragé les auteurs à continuer cette méthode de traitement. Neuf cas sont ici réportés.

ZUSAMMENFASSUNG

Behandlung alter, nicht vereinter infizierter Brüche

Die Autoren haben in den letzten Jahren, 25 Fälle von infizierten, nicht vereinten Brüchen, mittels Resection der osteomyelitischen Teile, behandelt, Anfrischung der Knochenenden, innere Fixation, wenn dies nötig war um die Annäherung zu erhalten, und Sicherung einer dauernden Drainage durch Tamponade der weit offen gehaltenen Wunde. Flüssigkeit, Transfusion und unterstützende medikamentöse Behandlung werden der Indikation gemäss vor und nach der Operation gegeben. Das Resultat dieser Fälle hat die Autoren in der Fortsetzung dieser Behandlungsmethode bestärkt. Neun Fälle sind beschrieben.

RESUMEN

Tratamiento de fracturas viejas infectadas que no se han unidos

Durante los ultimo cinco años, los autores han tratado 25 casos de fracturas viejas infectadas, resectando las superficies osteomyeliticas, limpiando las extremidades del hueso, empleando fijación interna cuando esta pareciera precisa para mantener aproximación, y asegurando drenaje continuo mediante incisión llenada bien abierta. Se dan como indicados antés de y después de operar, flúidos, transfusiones, y medicaciones. El resultado en estes casos ha sido tal que los autores seguirán tratando así. Se describen nueve casos.

RIASSUNTO

Trattamento delle vecchie fratture infette non unite

Negli ultimi cinque anni gli Aa. hanno trattato 25 casi di fratture infette non unite, mediante resezione dell'area osteomielitica, sezione delle estremità ossee, fissazione interna quando appariva necessaria per mantenere la vicinanza e continuo drenaggio mediante zaffamento della ferita largamente aperta. Somministrazione di liquidi, trasfusioni e medicamenti adattati vengono dati secondo indicazione prima e dopo l'operazione. I risultati ottenuti in questi casi hanno incoraggiato gli autori a continuare questo metodo di trattamento. Sono riportati nove casi.

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Correlation in the Use of Mineralized Foods and Vitamins in Treatment

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THE period of wonderment regarding vitamins and mineral content of foods has given way to one of practicability. The marvels of the vitamin alphabet have caught and held the popular fancy and have emphasized the importance of sound nutrition. It has been recently said that more progress has been made in the science of nutrition in the past two decades than in all time previous. The demonstration of the extent of vitamins in their important function has been the chief item of this progress.

The query is made, "What of the practical application of this research in the fields of health; the restoration of health, and the prevention and cure of disease?" The answer is that every thorough examination, whether the case be surgical or medical, must include a check-up for such deficiencies and, if they exist, every means should be taken to overcome them. This is particularly true in preoperative preparation. Muilin has said that the physician relies upon the dietitian to tell him which foods contain various vitamins. Thus, like the pharmacologist who fills the drug prescription, too much is expected of the dietitian to fill food prescriptions that will meet all of the varying needs of the individual, both in health and disease. This requirement is impossible, since the dietitian must know not only the vitamins, minerals and other values of foods, but also the indications for their application to the various diseases. Furthermore, unlike the exact drug prescriptions, this food prescription is rarely stated by the physician in any degree of complete detail. Frequently the task is beyond the dietitian's ingenuity or scientific knowledge.

The demands for caloric restrictions may not meet the standards for minimal, to say nothing of optimal, adequacy with regard to vitamins, if not minerals. The question of a further complication arises if the patient is allergic or resistant to foods which are highly desired because of their vitamin and mineral content. Clearly, the answer is that the dietitian cannot meet the requirements of optimal adequacy in frequent instances without the help of vitamin and mineral concentrates. Should she then be sufficiently informed regarding such products so that she would be qualified to recommend the need for their supplementary use to the physician? Or, in the light of the failure of ordinary foods, should she retire in favor of the pharmacologist? In other words, when do vitamins and minerals cease to be foods and become drugs?

Vitamins and minerals, whether in foods or as concentrates, may be considered to come more nearly within the definition of foods, and as such they are the concern of the dietitian. On the other hand, foods are like drugs in many respects, but it is clear that both are adjuncts to the physician in his practice of the healing art and science. The current and indiscriminate use of "shot-

gun" vitamin therapy without due regard to the relationships of the various vitamins, minerals and other food substances, is sure to go the way of other temporary fashionable "cure-all" fads. Vitamin capsules and mineral concentrates should not be considered as panaceas for all nutritional problems, as valuable as they may be in supplementing well-planned diets.

Vitamin C deficiency in chronic infection, such as gastric or duodenal ulcer and particularly osteomyelitis, has been found universal and its rectification has been most effective in curing these conditions. We have recently reached the conclusion that in every case of acute or chronic infection there should be, as a routine, a careful laboratory examination as to vitamin C deficiency. Spectacular cure of the principal symptoms of pellagra by the use of nicotinic acid, or of scurvy by the use of ascorbic acid, does not wholly solve the nutritional problem of the patient suffering from these diseases. The dietitian should supplement such foods by a properly regulated diet which will bring about a normal nutrition of the patient. The fact that certain foods are likely to be disliked by the patient, or that there may be certain allergic conditions to be overcome should be given consideration.

Elvehjem, speaking recently before the American Dietetic Association said: "What is the dietitian to do about synthetic vitamins? They are here; what stand is going to be taken? The clinician is finding them valuable in many instances and surely it will be desirable to make the proper use of them. In doing so, we must not lose sight of the joy of consuming natural, nutritious food." He continued, "If our natural foods need supplementation with synthetic products, should they be supplied through the grocery store or the drug store?" Some may prefer, as he said, to consume their daily supply of thiamin in the form of a pork chop, their riboflavin (vitamin G) as a glass or two of milk, and their nicotinic acid (vitamin B_6) as a small piece of liver. However, as Elvehjem has said, this does not mean that certain foods should not be fortified with some of the above compounds under specific conditions. Whether or not certain foods should be supplemented with these compounds, according to Elvehjem, is a problem for our dietitians to consider.

It is the opinion of the writer that in all complicated problems the dietitian should be in very close cooperation with, and should work under the guidance of, the internist and the surgeon, and also in many instances the biochemical laboratory. Difficult problems in all of their intricacies cannot be properly handled short of this. The ideal conditions should be still further enhanced by carrying on this work in a well co-ordinated institution. If possible, the institution should have its own farm where its fruits, vegetables, dairy products (including whole unpasteurized milk) and meats of various kinds can be mineralized during the period of their production under the direction of a well organized biochemical laboratory. The advantages of whole milk should be appreciated in that pasteurization destroys the vitamin content of milk. With this in view, every hospital handling chronic medical and surgical cases should be so organized that these objections may be fulfilled—namely, a competent dietitian should be in constant cooperation with the medical department, the biochemical laboratory and the farm.

Modern medical practice has for its objective a thorough study and complete control of all phases of a patient's life. Such a procedure to be thorough must include an investigation of the patient's family, past and present history; future plans and present activities; a comprehensive physical examination; laboratory tests which may be indicated, and a therapeutic regime based upon all of the findings. It should be realized that not only is the physical condition

of the patient of importance, but likewise his emotional reactions. To solve this problem, the physician must call to his aid many assistants, so much so that he often employs a team consisting of physicians with special training and equipment, nurses, laboratory technicians, dentists, X-ray technicians, social service workers, hospital administrators and, of particular importance for our present consideration, the dietitian.

How important is the dietitian to the physician or surgeon in the care of a very large percentage of his patients? A practical way of ascertaining this is to review some of the problems confronting a practitioner in which dietary planning and supervision are necessary. Many apparently normal persons are unknowingly on defective diets. The usual factors of safety have permitted these individuals to escape incapacity, but it is important to correct the deficiencies before an illness makes itself manifest in a physical or psychic fashion due to the dietary insufficiency. This type of work is a preventive and, while perhaps not spectacular, yields most satisfactory results. Opportunities to discover peculiarities in otherwise normal people constantly present themselves, such as idiosyncrasies to food, which may be either allergic or esthetic, but both are of great importance in formulating a rounded-out regime of treatment.

Alcoholism, for instance, must be treated with a suitable diet and the administration of vitamin B. Likewise, in certain deficiency diseases and metabolic derangements such considerations play an important role. For example, pellagra requires a high caloric, high protein and high vitamin B_2 diet; beriberi a high vitamin B_1 diet; scurvy a high vitamin C diet; rickets a high vitamin D diet and a proper calcium-phosphorus balance; sprue requires intrinsic and extrinsic factors and low fat diet; gout low purines and, some workers believe, a low fat diet. Diabetes mellitus cannot be treated without intensive dietetic instruction. The same is true of obesity. Hypoglycemia, due to excessive function of the islands of Langerhans, requires a low carbohydrate diet.

It is apparent that gastro-intestinal disorders by their very nature require dietary supervision. Hyperacidity may be corrected by alkalies, but it is often caused by improper foods as well as emotional factors. Gastric or duodenal ulcers are usually treated by some form of the Sippy diet, which should always be supplemented by vitamin C administration. Gallbladder disease is usually alleviated by a low fat intake. In colitis, low roughage, adequate vitamins and in some cases an apple diet, are prescribed. Chronic constipation is helped not only by proper habits but by adequate roughage, sufficient water intake and occasionally by laxative foods. Liver diseases, such as cirrhosis, should be treated by a diet low in fat, high in carbohydrates but free of condiments, with a minimum of roughage, no alcohol and with all foods of moderate temperature. In addition, high vitamin B and K intake is desirable. Nephritis requires attention to water and salt intake. As an illustration of certain endocrine problems other than diabetes, the hyperthyroid patient requires an adequate number of calories with a proper amount of carbohydrate and protein, and in parathyroid disease the calcium-phosphorus balance plays an important role.

In certain known instances, the presence of vitamins is necessary for the proper assimilation of minerals, as illustrated in the case of vitamin D and calcium. Vitamin D assists in the deposition of calcium and phosphorus in bones and teeth. The vitamin does not take the place of, or lessen the need for, these elements, but simply makes conditions satisfactory for their deposition. Several forms of vitamin D have been isolated, but only two are important from the standpoint of human nutrition. These are vitamin D or D_2, appearing in largest

amounts in fish liver oils and artificial vitamin D or D_2, produced by the irradiation of ergosterol.

The thought occurs, if the above is true, that physiotherapy consisting of massage, carried on during heliotherapy treatments, may help to disseminate vitamins created by the sun irradiation of the fats and sterols in the skin at the time and, accordingly, for some time this practice has been carried out whenever possible in all tuberculous or other chronic bone or joint lesions.

No field of nutrition has received more attention than that which concerns the formation of the bones and joints. Laymen consider bones as solid substances with fixed structures that are subject to little change; to the biochemist, however, they are ever-changing. In the early period of life they have ability to grow, exceeding that of most parts of the body. The study of bones and their growth is an immense field in itself, since it includes the literature of rickets which, in turn, leads to vitamin fields. The fundamental importance of a nutritionally adequate diet from birth until the crowns of the third permanent molars are formed is most important.

Koehne recommends the following preventatives, correctives or causes of tooth decay: (1) The nutritional completeness of the diet; (2) the use of vitamin D, especially while the teeth are being formed; (3) either the intake or the metabolism of calcium and phosphorus is related to susceptibility to caries; and (4) the cause of dental caries centers in the acid neutralizing power of blood and saliva.

It is accepted that the nutritional adequacy of the diet is of fundamental importance from the prenatal period through adolescence for the development of a sound healthy body and well-formed skeleton, as well as well-enameled teeth with satisfactory occlusion.

In accordance with all other nutritive essentials, the vitamins must be supplied in the diet in sufficient amounts if growth and health are to result. Planning of diets to this end depends upon a knowledge of the quantities of each of these nutrients needed by the body and of their quantitative occurrence in foods. The subject, as a whole, is relatively new and opinions expressed at this time must be considered more or less tentative in nature. It is urgently requested that this approach be kept distinctly in mind in accepting the values given, so that future revisions made necessary by new data obtained in studies now under way or undertaken later will seem logical and in order.

Most food is subjected to conditions or treatments that reduce its original vitamin content in one respect or another before it is consumed. Possible decrease in the vitamin content of a food should be taken into account when its contribution to the diet is reckoned, rather than simply entering it on the basis of an assay value obtained when it was in a relatively fresh state. Cooked food cannot be considered as having the full vitamin value of the fresh raw product, since foods cooked by some methods retain very little, if any, of their original vitamin potency.

In the first place, this consideration points clearly to the necessity for assuring a liberal supply of vitamin-rich foods in the diet, and for taking every precaution to retain as much as possible of the initial vitamin value during refrigeration, and before or in the preparation of the food; secondly, it shows the futility of taking for granted that the diet contains the exact number of units of any particular vitamin as calculated from the figures given in current statistics.

It is now possible to classify most foods for vitamin value according to type. Thin, green leaves are all excellent sources of vitamin A with values ranging in the neighborhood of 15,000 I.U. per 100 gm. of fresh edible portion. Other green and yellow vegetables are somewhat less rich, assaying from something less than 1,000 to 5,000

I.U. per 100 gm. Most vegetables in the fresh, raw state are good sources of vitamin B_1, averaging approximately 50 I.U. per 100 gm. The various citrus fruits are all excellent sources of vitamin C.

We wish to confirm the opinion of Alton Ochsner, Professor of Surgery of Tulane University, New Orleans, in the following statement in a letter to the author, that we are thoroughly convinced that vitamin C particularly is of inestimable value in both acute and chronic infections: "Whereas, in the beginning we used relatively small doses, approximately 100 mg. of cevitamic acid in twenty-four hours, we now feel that the patient with a severe infection should have as much as 1,000 mg. every twenty-four hours. The more fulminating the acute infection and the longer a chronic infection has continued, the more is the need for vitamin C. In the presence of infection, vitamin C is rapidly destroyed and its deficiency also predisposes to infection so that a vicious circle is set up. So convinced are we of the efficacy of vitamin C in infections that every patient we have with an ulcerating lesion, such as carcinoma of the stomach or the rectum, is given cevitamic acid for a number of days preoperatively and, undoubtedly, this has had a great deal to do with the smoothness of their convalescence."

Vitamin C also is of prime importance in the formation of collagen, and it is because of this that it is of particular usefulness in cases of osteomyelitis and tuberculous bone and joint disease. The following statements by Ochsner have been confirmed by the treatment of a large variety of infected surgical cases:

"Lanmen and Engles *(Vitamin C Deficiency in Wound Healing; Experimental and Clinical Study, Ann. Surg. 105:616, 1937)* showed that vitamin C deficiency interfered with wound healing, particularly producing a defective repair of the corium and poor production of collagen in the scars. Similar observations were made by Taffel and Harvey *(Effect of Absolute and Partial Vitamin C Deficiency on the Healing of Wounds, Proc. Soc. Exp. Biol. and Med. 38:418, 1938)*. Of particular importance in the question of osteomyelitis is the work of Hanke *(Experimentelle untersuchungen ueber Beinflussung der Knochenregeration durch Vitamin C, Deutsche Ztschr. f. Chir. 245:530, 1935)*, who showed that following the administration of vitamin C there was apparent acceleration of bone healing in fractures. Of significance is the report by Abassy, Harris and Hill *(Lancet 2:177, 1939)*, who studied 17 active cases of osteomyelitis. They found a diminished rate of excretion of vitamin C in the urine and lowered response to test doses of vitamin C, indicative of apparent increased use of this vitamin during an infective process."

We shall assume that under most conditions of normal living the mineral requirements will be satisfied by a well-balanced diet. In certain pathologic states and in a few conditions associated with physiologic changes, an adequate mineral intake may not be accomplished. It is probably too much to expect that the human body is sufficiently ingenious as to possess a danger signal for the inadequate ingestion of calories and for inadequate intake of fluid. It should be even more appreciated that we have no recognized signal to indicate a lack of minerals, either as salts *per se* or as constituents of food. If an individual is not ingesting sufficient food, the pangs of hunger tell him so. If the body lacks water, the sensation of thirst prompts him to drink. But if one is deficient in sodium chloride or certain other minerals or calcium salts, the deficiency persists until it is evidenced by clinical signs or by chemical analyses of body fluids.

In this respect, a careful survey by a biochemical laboratory of an individual seeking the retention, restoration of his

health or the cure of his disease is most important. This should be one of the several facilities available in a properly organized and correlated medical or surgical practice, if the most is to be made of the very latest findings in the relatively new fields of research.

SUMMARY

It has been recently said that more progress has been made in the science of nutrition in the past two decades than in all time previous. The demonstration of the extent of vitamins in their important function has been the chief item of this progress.

The query is made, "What of the practical application of this research in the fields of health; the restoration of health, and the prevention and cure of disease?" Muilin has said that the physician relies upon the dietitian to tell him which foods contain various vitamins. Thus, like the pharmacologist who fills the drug prescription, too much is expected of the dietitian to fill food prescriptions that will meet all of the varying needs of the individual, both in health and disease.

Vitamins and minerals, whether in foods or as concentrates, may be considered to come more nearly within the definition of foods, and as such they are the concern of the dietitian. On the other hand, foods are like drugs in many respects, but it is clear that both are adjuncts to the physician in his practice of the healing art and of science.

The current and indiscriminate use of "shotgun" vitamin therapy without due regard to the relationships of the various vitamins, minerals and other food substances, is sure to go the way of other temporary fashionable "cure-all" fads.

The King of all vitamins in disease is vitamin C. Deficiency of this vitamin has been found in scurvy, ulcers of the gastrointestinal tract, gingivitis and, especially in osteomyelitis. It has also been found in pulmonary disease, rheumatic fever, diphtheria, etc. The rectification of this vitamin deficiency has been found most helpful in the cure of these conditions.

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RÉSUMÉ

Pour l'usage therapeutique des aliments mineralizés et des vitamines

On a dit récemment qu'un plus grand progrès a été accompli dans la science de la nutrition dans les deux dernières decades de ce qu'on a accompli dans l'entière période precedente. La demonstration de combien étendue soit l'importante fonction des vitamines a été le point principale de ce progrès.

On demande quelle soit l'application pratique de ces recherches dans le camp de l'hygiène, du retablissement de la santé, prevention et cure des maladies. Muilin a dit que le medecin compte sur le diététiste pour savoir quels aliments contiennent les diverses vitamines. Ainsi, comme du pharmacologiste qui prepare les prescriptions de medicaments, trop on attend du diététiste qu'il prepare prescriptions d'aliments qui satisfaient tous les besoins de l'individu, soit en santé, soit malade.

On peut considerez que les vitamines et les mineraux, soit dans les aliments que comme concentrés, soient plus proches à la définition de aliments et pour ça ils sont

de pertinence du diététiste. D'autre part, les aliments sont comme les medicaments sous beaucoup de rapports, mais il est clair que tous les deux sont des accessoirs pour le médécin dans so pratique de l'art et de la science du guérir.

L'usage courant et indiscriminé de la therapie vitaminique "à coup de fusil," sans le du respect pour le rapport des diverses vitamines, mineraux et autres aliments, surement ouvre le chemin à d'autres temporaire remèdes à la mode pour toutes les maladies.

Le roi de toutes les vitamines en medicine est la vitamine C. Défauts de telle vitamine ont été trouvés dans le scorbut, dans les ulcères du canal gastro-intestinale, dans les gengivites, et specialement dans l'ostéomyelite, ainsi que dans les maladies pulmonaires, rheumatisme, diphtérie, etc. La rectification du défaut de cette vitamine a aidé beaucoup la cure de ces conditions.

ZUSAMMENFASSUNG

Grundlegende Wechselbeziehung in der therapeutischen Anwendung mineralhältiger Nahrungsstoffe und Vitamine

Es wurde vor kurzen festgestellt, dass in den zwei letzten Jahrzehnten mehr Fortschritt in der Ernährungslehre gemacht wurde, als in der ganzen Vergangenheit. Die Demonstration des Ausmasses der wichtigen Funktion der Vitamine, bot den Hauptgegenstand dieses Fortschrittes.

Die Frage ist: "Was ist die praktische Bedeutung dieser Forschungen in Gebiete der Gesundheitslehre; der Wiederherstellung der Gesundheit und der Vermeidung und Heilung von Krankheit." Muilin betonte dass der Arzt sich auf Angaben der Diätetiker verlasse, bezüglich des Vitamingehaltes verschiedener Nahrungsmittel. Folglich wird, so wie vom Pharmakologen der die Arzneiverordnung ausarbeitet, auch vom Diätetiker vorausgesetzt, dass er eine Diät ausarbeitet, die den verschiedenen Anforderungen des Individuums sowohl in Gesundheit als auch in Krankheit, entspricht.

Vitamine und Minerale, sei es in Nahrungsmittel oder in konzentriertem Zustande, gehörem in engeren Sinn zum Begriff von Nahrungsmittel, und sind als solche die Angelegenheit des Diätetiker. Andererseits, sind Nahrungsmittel in vieler Hinsicht wie Drogen, doch ist es klar, dass beide in das Gebiet des Arztes fallen in seiner Tätigkeit in Heilkunst und Wissenschaft.

Die gegenwärtige unüberlegte Anwendung von konzentrierter Vitamintherapie ohne gebührende Rücksichtnahme auf das gegenseitige Verhältnis der verschiedenen Vitamine, Minerale und anderer Nahrungsmittel, wird sicherlich den Weg aller anderen temporär modernen "Allheilmittel" gehen.

Der König aller Vitamine Erkrankungen ist das Vitamin C. Mangel dieses Vitamins wird in Skorbut, Geschwüren des Magen-Darm-Trakts, Gingivitis und besonders in Osteomyelitis, auch in Lungenerkrankung, rheumatischen Fieber, Diphtheria, etc., gefunden. Die Berichtigung dieses Vitaminmangels wurde als die erfolgreiste Therapie in der Heikung dieser Zustände gefunden.

RESUMEN

Para el uso de alimentos mineralizados y vitaminas en tratamiento

Ultimamente se ha dicho que, en cuanto a la ciencia de nutrición, se ha realizado más progreso durante los últimos dos decenios de lo que se había hecho anteriormente. El punto más sobresaliente de tal progreso ha sido la demostración de la importancia de la función de las vitaminas.

Se ha preguntado, "¡ Qué se puede decir en cuanto a la aplicación práctica de tal progreso en el campo de la salud, en la restauración de la salud, o en impedir y curar enfermedades?" Mailin ha dicho que

el médico fía demasiado en el dietético para saber cuáles de los alimentos contienen las varias vitaminas. Resulta que se requiere que el dietético lleve un papel semejante a el de farmacologista, que prepara prescripciones—es decir, ha sido preciso que el dietético prepare prescripciones de alimentos para satisfacer todo estado del individuo, sea en salud o en enfermedad.

Las vitaminas y los minerales, en alimentos o en concentraciones, pueden considerarse como alimentos, y como tal, tienen que ver con el dietético. Por el otro lado, alimentos se parecen mucho a drogas, y es muy claro que ambos son muy útiles para el médico en su práctica del arte de curar.

El uso corriente y promiscuo de terapía de "escopeta" sin considerar las relaciones entre las diferentes vitaminas, los minerales, y otras materias de alimento no tardará mucho en desaparecer.

En casos de enfermedad, puede considerarse la vitamina C como reina de todas. Se ha dado cuenta a la falta de esta vitamina en casos de escorbuto, úlceros gastro-intestinales, gingivitis, y especialmente en osteomielitis. También se encuentra en enfermedades de los pulmones, fiebra reumática, difteria, etcétera. La rectificación de tal falta de vitamina ofrece gran ayuda en el tratamiento y cura de dichas enfermedades.

RIASSUNTO

Per l'uso terapeutico di alimenti mineralizzati e vitamine

E stato detto recentemente che è stato fatto maggior progresso nella scienza della nutrizione negli ultimi due decenni che nell'intero periodo precedente. Il punto principale di questo progresso è stato la dimostrazione di quanto estesa sia l'importante funzione delle vitamine. Si domanda quale sia l'applicazione pratica di queste ricerche nel campo dell'igiene, ristabilimento della salute, prevenzione e cura delle malattie. Muilin ha detto che il medico dipende dal dietologo per sapere quali alimenti contengano le varie vitamine. Così, come dal farmacologo che prepara ricette di medicamenti, troppo si aspetta dal dietologo che prepari ricette di alimenti che soddisfino tutti i bisogni dell'individuo, sia in salute che malato.

Si può considerare che le vitamine e i minerali, sia negli alimenti che come concentrati, si avvicinino di più alla definizione di alimenti e perciò sono di pertinenza del dietologo. D'altra parte gli alimenti sono come i medicamenti sotto molti rapporti, ma è chiaro che ambedue sono accessori per il medico nella sua pratica dell'arte e della scienza del guarire.

L'uso corrente e indiscriminato della terapia vitaminica "a colpo di fucile," senza il dovuto riguardo al rapporto delle varie vitamine, minerali e altri alimenti, sicuramente apre la via ad altri temporanei rimedi di moda per tutte le malattie.

Il re di tutte le vitamine in medicina è la vitamina C. Deficienze di quessta vitamina sono state trovate nello scorbuto, nelle ulcere del tubo digerente, nelle gengiviti, e specialmente nelle osteomieliti, come anche nelle malattie polmonari, reumatismo, difterite, ecc. Il rettificare la deficenza di questa vitamina ha aiutato molto la cura di questi disturbi.

Patellar Advancement Operation
A Revised Technic

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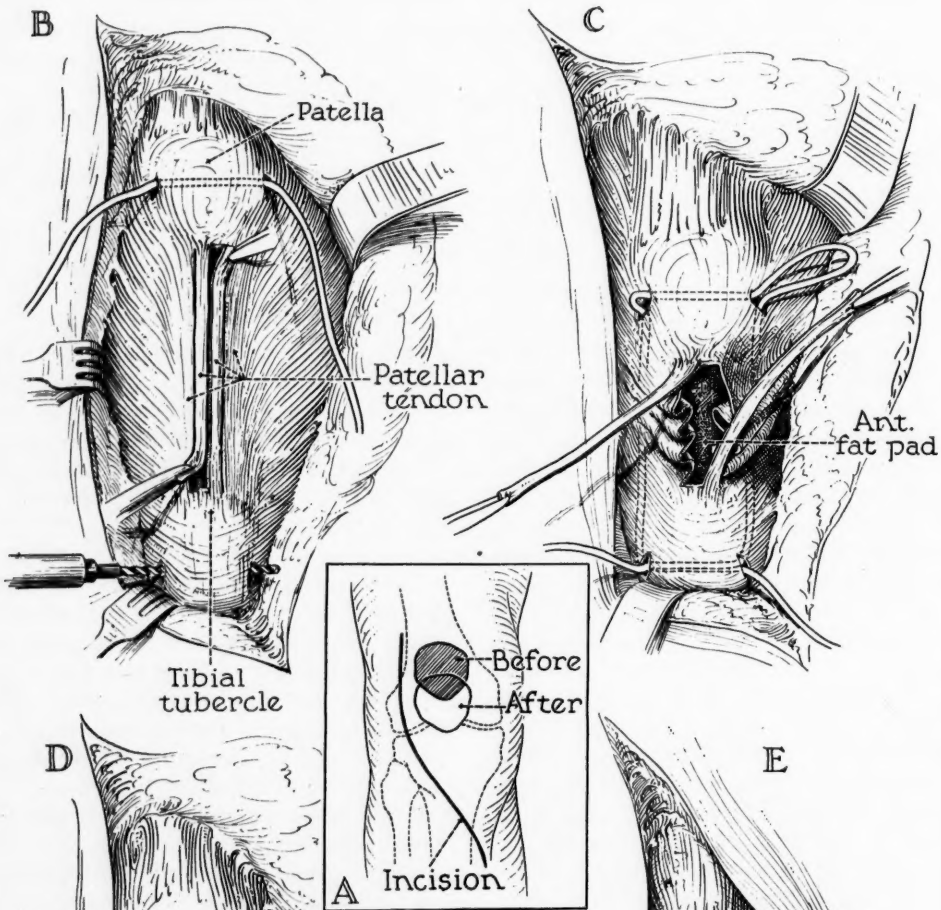
IN a paper published in 1933, the author described the relation of the abnormally high patella to the continued flexed position of the knees ("jump position") in spastic paralysis. An operation for patellar advancement was presented. This operation was designed to replace the patella to its normal position in relation to the knee joint and thereby re-establish the normal leverage of the quadriceps muscle. The bone at the insertion of the patellar tendon was advanced to a point more distal on the tibia, thereby bringing the patella to a position opposite the joint line. This procedure is successful in a great majority of cases. Good results have been reported by Heyman, Wagner, Cleveland, Speed, Burns and many others. In several cases the author has had difficulty in maintaining the position of the transplanted block of bone. Other surgeons have encountered the same problem and have devised many variations of technics in an effort to accomplish this transplantation.

The patella is anchored by wiring or transfixing it with a steel pin and the transplanted graft is held in position by a wide variety of ingenious technics. When the patella has been held in an advanced position, the correction of the "jump position" is most satisfactory. As our experience with this operation became larger, two other defects of the technic described became evident. First, the operation seemed more extensive and complicated than necessary and, second, the possibility of arresting the growth of the anterior portion of the upper tibial epiphysis became evident. This latter point was mentioned in a paper published in 1939. Since that time, one case in which bilateral "back knee" developed from this procedure has been observed.

REVISED TECHNIC

A simplified technic for patellar advancement is hereby presented. On operation, the patellar tendon is exposed by a curved incision beginning at a point just lateral and about one inch proximal to the upper lateral border of the patella, continuing distally and medially across the distal portion of the tendon to a point about one inch below the tibial tubercle over the anteromedial aspect of the tibia (Fig. 1A). The superficial fascia is divided and the patella and tendon are exposed by retraction. The center of the patella is drilled transversely and a flexible chromium wire or heavy braided silk is inserted (Fig. 1B). A second transverse drill hole passing through the crest of the tibia at a point just below the tubercle is made. A curved sharp cannula is then inserted under the aponeurosis at the lateral end of the tibial drill hole and forced proximally beneath the aponeurosis until it emerges at the lateral end of the drill hole in the patella. The lateral portion of the wire is inserted into the lumen of the cannula, which is then withdrawn. The same procedure is carried out with the medial end of the wire. Both ends of the wire are then passed through the hole in the tibia


B
Patella
Patellar tendon
Tibial tubercle
C
Ant. fat pad
Before
After
A
Incision
D
E
Advancement of patella by plication method.
Lucille Cassell '39

(Fig. IC). The patellar tendon is incised in the midline (Fig. IA). Narrow strips of patellar tendon are cut from the free margins of the tendon (Fig. IB). One strip is left attached to the patella, the other to the tibia. The wire is drawn taut and fixed by twisting, bringing the patella to a normal position in relation to the joint (Fig. ID). The thin strips of tendon are laced through the redundant margins of the patellar tendon and finally anchored to the opposite portion of the tendon (Fig. IE). The plicated tendon is fixed with interrupted silk sutures and the skin is closed. A posterior splint is applied for several days, after which active motion is begun.

The advantages of this operation are as follows:

1. The normal leverage of the patella is re-established, as in the original operation, by a less extensive and shorter procedure.

2. The possibility of arrest of growth of the upper tibial epiphysis is eliminated.

3. The patellar tendon is increased in size and strength by plication.

SUMMARY

An operation is described which obviates the possibility of arrest of growth. The patellar tendon is split longitudinally in the midline and strips of the tendon are loosened for subsequent use as tendon sutures. A wire is placed through the body of the patella and carried underneath the deep aponeurosis and fastened through a drill hole in the crest of the tibia distal to the tubercle. The patella is pulled down to its normal position. The relaxed patellar tendon is then plicated by interweaving the strips of tendon mentioned above. The knee is splinted for a few days, after which active movement is instituted.

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RÉSUMÉ

Modification de la téchnique pour l'operation d'avancement de la patelle

En 1933 l'auteur rapporta ses observations sur la position particulièrement haute de la patelle en relation au genou dans de cas de paralysie spastique et décrivit aussi le rapport entre cette déformité et la ainsi appellée "position de saut" de ces cas. La patelle était placée sur la face anterieure du fémur au lieu d'être sitée dans le normal sillon intercondyloïdien. Lorsque le genou était fléchi de 90° et vu dans la position laterale, l'articulation présentait un contour angulaire à cause de l'extraordinaire saillie de la patelle au devant des condyles fémoraux. Examens radiologiques dans cette époque zévélaient distinct allongement du tendon patellaire. Une operation appellée "Réintegration du normal mouvement de bascule de la patelle dans la déformité de la fléxion du genou dans la paralysie spastique," fut presentée. Cette operation consistait dans l'avancement de la surface d'insertion du tendon patellaire dans un point plus distale sur la tibia. Cette operation était très efficace dans l'accomplissement de l'entière extension du genou, mais elle présentait des risques lorsque'elle était appliquée dans des enfants en croissance. Ces risques étaient surtout dans le danger de l'arrêt de la croissance de l'epiphysis superieure de la tibia lorsque le bloc d'os à l'insertion du tendon patellaire venait déplacé.

Le present travail décrit une operation qui prévient la possibilité d'un arrêt de la croissance. Le tendon patellaire est séparé

longitudinalement dans la ligne moyenne et bandes de tendon sont liberées pour l'usage successif comme sutures pour le tendon. Un fil est placé à travers le corp patellaire et porté au dessous de la aponévrose profonde et fixé dans un trou à la crête de la tibia distale en rapport au tubercule. La patelle est faite descendre dans sa normale position. Le tendon patellaire détendu vient puis plié en entremêlant les bandes de tendon cidessus citées. Le genou vient immobilizé pour peu de jours et après on commence mouvement actif.

ZUSAMMENFASSUNG

Verbesserte Technik der Operation zur Vorschiebung der Patella

Im Jahre 1933 veröffentlichte der Autor seine Beobachtungen über die ungewöhnlich hohe Lage der Patella im Verhältnis zum Knie, bei Fällen von spastischer Lähmung und beschrieb auch das Verhältnis dieser Deformität zu der sogenannten "Sprung Stellung" dieser Fälle. Die Patella ritt auf der Vorderfläche des Femur, statt in die normale Intercondylargrube zu fallen. Bei einer Beugungsstellung des Knie von 90° und Seitenansicht, bot das Gelenk eine eckige Kontur, hervorgerufen durch das ungewöhnliche Hervortreten der Patella vor den Condylen des Femur. Zu diesem Zeitpunkte zeigten Röntgenbilder deutliche Verlängerung der Patellarsehne. Es wurde eine Operation beschrieben, genannt: "Wiederherstellung einer normalen Hebelwirkung der Patella in Kniebeugungs deformität bei spatischer Paralyse." Dies bestand in der Vorrückung der Ansatzfläche der Patellarsehne zu einem weiter distal gelegenen Punkt der Tibia. Diese Operation erwies sich als sehr erfolgreich in der Erzielung einer kompletten Extension des Knie, doch ergaben sich einige technische Risken, wenn sie bei Kindern im Wachstum angewendet wurde. Die Gefahr bestand hauptsächlich in einer Wachstumshemmung der oberen Epiphyse der Tibia, durch die Entfernung des Knochenstücks an der Insertionstelle der Patellarsehne.

Der gegenwärtige Bericht beschreibt eine Operation, die der Möglichkeit einer Wachstumshemmung vorbeugt. Die Patellarsehne wird der Länge nach in der Mitte gespalten und Streifen der Sehne werden gelöst, um späterhin als Nahtmaterial zu dienen. Ein Draht wird durch den Patellarkörper gezogen, unter die tiefe Aponeurose geführt und durch ein Bohrloch in der Tibiakante, distal vom Tuberculum befestigt. Die Patella wird zu ihrer normalen Lage hinunter gezogen. Die lockere Patellarsehne wird dann, durch einweben der oben erwähnten Sehnenstreifen, gefaltet. Das Knie wird für einige Tage geschient, wonach aktive Bewegung angewendet wird.

RESUMEN

Operación para Avance de la Rótula Téinica Revisada

En 1933, publicó el autor sus observaciones sobre la posición muy alta de la rótula en relación a la rodilla que ocurre en casos de parálisis espástica, y también describó la relación entre tal enfermedad a la "posición de salto" de estos casos. La rótula se puso sobre el aspecto anterior del femur en vez de caer en la muesca intercondilar normal. Cuando se dobló a 90° y se vió de la posición lateral, la articulación presentó contorno a causa de la prominencia de la rótula delante de los cóndelos del femur. Estudios mediante rayos de Roentgen, hechos entonces, mostraron una prolongación marcada del tendón de la rótula. Se presentó una operación llamada "Re-establecimiento de la Acción Normal de la Ró-

tula en Casos de Deformidad de la Flexión de la Rodilla en Parálisis Espástica." Consistió esta en avance de la superficie de inserción del tendón de la rótula hasta una posición sobre la tibia más distante del punto de adherencia. Tuvo bastante éxito en cuanto a establecer una extensión completa de la rodilla, pero presentó algunos peligros técnicos en cases de niños crecientes. Consistieron estos peligros en el de impedir el crecimiento de la epífisis superior de la tibia al remover el pedazo de hueso cuando se inserta el tendón de la rótula.

El presente papel describe una operación que obvía la posibilidad de impedir el crecimiento. El tendón de la rótula se divide longitudinalmente por el centro y tiras se aflojan para emplearse como suturas más tarde. Un hilo se pone dentro del cuerpo de la rótula, se lleva debajo de la aponeurosis honda y se fija por un agujero de taladro en la corona de la tibia distante del tubérculo. La rótula está tirada a su posición normal. El tendón relajado entonces se pliega mediante el tejido de las tiras del tendón arriba mencionadas. La rodella se entabila durante algunos días, y entonces movimiento activo empieza.

RIASSUNTO

Modificazione della tecnica per l'operazione di avanzamento della rotula

Nel 1933 l'A.riferi le sue osservazioni sulla posizione particolarmente alta della rotula in relazione al ginocchio in casi di paralisi spastica e descrisse anche il rapporto tra questa deformità e la cosi detta "posizione di salto" di questi casi. La rotula era situata sulla faccia anteriore del femore invece di essere posta nel normale solco intercondiloideo. Quando il ginocchio era flesso di 90° e visto dalla posizione laterale, l'articolazione presentava un contorno angolare a causa della insolita prominenza della rotula davanti ai condili femorali. Esami radiologici in quella epoca mettevano in evidenza un distinto allungamento del tendine patellare. Fu presentata un'operazione chiamata "Ristabilimento del normale movimento di leva della rotula nella deformità della flessione del ginocchio nella paralisi spastica." Questa operazione consisteva nell'avanzamento dell'area di inserzione del tendine patellare a un punto più distale sulla tibia. Questa operazione era molto efficace nel portare a termine la completa estensione del ginocchio ma presentava dei rischi quando applicata a bambini in crescita. Questi erano soprattutto nel pericolo di arresto della crescita della epifisi superiore della tibia quando veniva rimossoil blocco di osso all'inserzione del tendine rotuleo.

Il presente lavoro descrive un'operazione che ovvia alla possibilità di un arresto della crescita. Il tendine patellare è separato longitudinalmente sulla linea mediana e striscie di tendine vengono liberate per successivo uso come suture per il tendine. Un filo è posto attraverso il corpo della rotula e portato al di sotto della fascia profonda e fissato attraverso un buco di trapano alla cresta della tibia distale rispetto al tubercolo. La rotula è spinta in basso nella sua normale posizione. Il tendine rotuleo rilasciato viene poi piegato intzecciando le striscie di tendine sopra citate. Il ginocchio è immobilizzato per alcuni giorni, dopo di che si comincia movimento attivo.

Skin Graft for Spina Bifida with Meningocele or Myelomeningocele*

OSWALDO PINHEIRO CAMPOS, M.D.

RIO DE JANEIRO, BRAZIL

SPINA bifida complicated with myelomeningocele or meningocele is one of the most serious congenital malformations of the newborn. The mortality is impressively high according to statistics. Moore found an operative mortality of 50 per cent and expressed the opinion that surgical intervention should not be attempted before the fifth year of life. Frazier reported that 80 per cent die before the first year, with or without surgical intervention. Leriche stated that 80 per cent die before the first year, 10 per cent of the remainder before the fourth year, and the operative results are very poor in the other 10 per cent. Greisfwald and Denuce have found the mortality to be 100 per cent in infants not operated upon. From a total of 647 infants not operated upon in England, 615 died before the first year.

The mortality is much higher in myelomeningocele than in meningocele. It would be of importance to the surgeon, therefore, to know the type of spina bifida with which he is dealing. Unfortunately, there are no signs which permit the differentiation of these two types with absolute certainty. From the surgical point of view, we should consider every case with ulceration of the protruding cystic bag as myelomeningocele, and such a protruding cystic bag should be immediately protected by a full-thickness skin graft.

It is a very well known fact that when the protruding cystic bag is covered with skin, there is no danger of impending death and, as a rule, the infant will survive. When the protruding cystic bag is ulcerated, there is danger of rupture and infection, or infection even without rupture, and they all die of meningoencephalitis unless an operation is performed to close up the sac. Considering the high mortality of all the operations in the treatment of complicated spina bifida at an early stage, and because of the poor end-results, John Hilton of Guy's Hospital, London, advocates that it is better to protect the protruding cystic bag with some special dressing to avoid infection and to leave the rest to nature. He stated: "It is much better to do this than to cause death or create an invalid with the knife." Many types of dressings have been devised, but we know that invariably they all fail their purposes, because it is impossible to keep the dressings sterile. I have found that by making a "dressing" with a skin graft, thus converting an ulcerated myelomeningocele into one covered with skin, infection may be avoided and in the same manner the consequent meningoencephalitis.

The protruding cystic sac of the myelomeningocele is extremely sensitive and must be treated with caution. It should not be opened in a patient less than four years of age. The methods of removing or reducing

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it tend to injure the very sensitive nerve elements, producing too great a shock in a patient less than four years of age. The tissues of a newborn infant are too delicate to perform any plastic operation dealing with muscles and deep fasciae, because they practically do not exist for surgical purposes. Heterogeneous grafts are seldom satisfactory. And yet the high mortality of spina bifida due to infection, during the first fifteen days of life, demands that immediate action be taken. The successful treatment of complicated spina bifida requires a simple operation conforming to the basic principle of extremely urgent surgery, to assure continuation of life.

Any operation that follows this basic principle, avoiding the fatal meningoencephalitis and respecting the nerve elements of the protruding cystic sac, will probably solve the emergency problem of the spina bifida complicated with myelomeningocele, and permit nature to take its course as the child develops. It is the consensus of opinion that the most opportune time for meningocele operations is after the child has attained the age of four years. It is also possible that this age may be the proper stage to perform the final plastic operation on the myelomeningocele as well as the meningocele.

In summarizing, it was thought that the immediate problem in spina bifida with an ulcerated protruding sac is to create a protection for the protruding sac by providing a cover of skin, or that of skin and superficial fascia. For this purpose an autoplastic skin graft has been used in all of our cases.

TECHNIC

The technic for autoplastic skin graft is as follows:

The cystic bag is cleansed with a nonirritating substance and the edges of the ulceration are incised. The sac is punctured and aspirated to relieve the liquid tension. An elliptical (arciforme) incision is made above the tumor, leaving about 5 mm. of skin around the pedicle. A second incision is made parallel to the first, to form a skin flap (it is best to include the superficial fascia) of the same width as the ulcerated area to be protected. The skin flap is then sutured to the borders of the skin of the tumor, with great care being taken to close the angles. A stay suture brings down and fixes the upper lumbar skin to the fibrotic pedicle of the herniated tumor. The upper lumbar flap is finally sutured to the inferior border of the first incision left for this purpose, with a rim of approximately 5 mm. (Fig. 1).

Fig. 1. Photograph showing skin flap sutured around the excised edges of the ulcerated area and the stay suture fixing the upper skin flap.

An occlusive dressing finishes up this simple procedure. Postoperative complications experienced with other methods, such as infection, leakage of spinal fluid and increase of intracranial pressure, have never been encountered with the protective autoplastic skin graft operation (Fig. 2).

It is advisable to bring the infant to the hospital for the operation if delivery occurs at home and to send him home as soon as possible. For various reasons, the mortality is less at home than in the hospital during convalescence, because of the constant care available which is usually impossible in a general hospital.

The postoperative care consists of not permitting the dressing to become wet, and keeping the infant's head lower than his body. Twelve infants have been operated upon, each developing a hydrocephalus, which proves that this complication is not the result of the excision of the cystic bag,

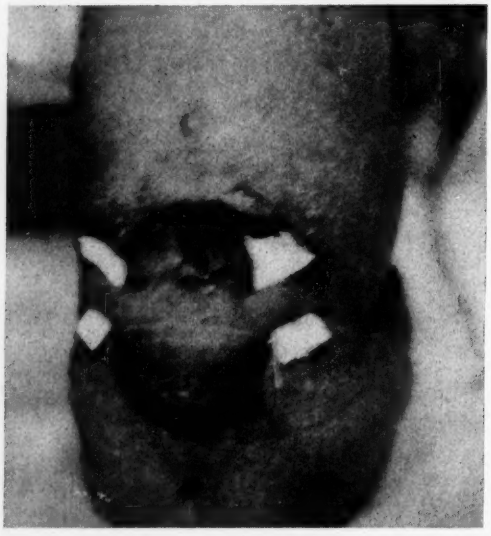

Fig. 2. Photograph showing the aspect after healing. The former ulcerated cystic bag is now transformed into a sac covered with normal thick skin, and is free of danger of rupture and consequent infection.

but that hydrocephalus and spina bifida with myelomeningocele are co-existing cerebrospinal malformations, and that hydrocephalus does not develop as a consequence of the operative excision of the cystic bag.

CONCLUSIONS

1. Covering the ulcerated cystic bag of the myelomeningocele with a full-thickness skin graft is the most effective means of preventing infection.

2. The cystic bag does not have, to my knowledge, any function in the reabsorption of the spinal fluid.

3. The cystic bag of myelomeningocele should never be excised, because of the cord elements and roots therein contained.

4. A method for covering the cystic bag of a myelomeningocele by an autoplastic full-thickness skin graft is described.

RÉSUMÉ

Greffe de peau pour spina bifida avec méningocele ou myeloméningocele

Le moyen le plus efficace pour prévenir infections consiste à couvrir le sac cystique du myeloméningocele ulcéré avec une greffe de peau à toute épaisseur. Le sac cystique n'a, je crois, aucune fonction dans la réabsorption du liquide spinal.

Le sac cystique du myeloméningocele ne devrait jamais être excidé parce que il contient elements de la moelle épinière et racines. Une méthode pour couvrir le sac cystique d'un myeloméningocele avec greffe autoplastique de peau à toute épiasseur vient décrite.

ZUSAMMENFASSUNG

Hauttransplantation bei spina bifida mit meningocele oder myelomeningocele

Das beste Mittel zur Vermeidung der Infektion bei Myelomeningocele ist, den ulcerierten Cystenbalg mit einem Hauttransplantat von voller Dicke, zu decken. Ich glaube nicht, dass der Cystenbalg bei der Reabsorption der Cerebrospinalflüssigkeit, eine Rolle spielt.

Der Cystenbalg einer Myelomeningocele soll nie excidiert werden, auf Grund der

Rückenmarksteile und Spinalwurzeln die darin enthalten sind. Es wird eine Methode zur Deckung des Cystenbalgs bei Myelomeningocele, durch ein autogenes Hauttransplantat von voller Stärke, gegeben.

RESUMEN

Trasplante del cutis en el tratamiento de la espina bifida con meningocele o mielomeningocele

La manera más segura de evitar infecciones es la de cubuir la vejiguilla cística ulcerada de mielomeningocele con un trasplante de cutis de plena espesura.

La vejiguilla cística, según creo yo, no tiene ninguna función en la reabsorción del flúido de la columna vertebral.

La vejiguilla de un mielomeningocele nunca debe ser cortado a causa de los elementos de cuerdas y de raíces allí contenidos.

Se describe un metodo de cubuir la vejiguilla cística de un mielomeningocele mediante trasplante autoplástico de cutis de plena espesura.

RIASSUNTO

Innesto cutaneo per spina bifida con meningocele o mielomeningocele

Il mezzo migliore per prevenire infezioni consiste nel coprire il sacco cistico del mielomeningocele ulcerato con un innesto di cute a tutto spessore. Il sacco cistico non ha, credo, nessuna funzione nel riassorbimento del liquido cerebro-spinale.

Il sacco cistico del mielomeningocele non dovrebbe mai essere asportato a causa degli elementi del midollo spinale e delle radici che esso contiene. E descritto un metodo per coprire il sacco cistico di un mielomeningocele con un innesto autoplastico di cute a tutto spessore.

THE INTERNATIONAL COLLEGE OF SURGEONS

Note: While the International College of Surgeons is founded in Geneva, Switzerland, it is also incorporated in the United States in Washington, D. C.

Subcutaneous Lengthening of the Achilles Tendon
Preliminary Report

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SOME time ago, Bayer devised a method for the subcutaneous lengthening of the Achilles tendon in which two horizontal incisions were made in that tendon, one medial and the other lateral, with a space between them corresponding to the amount of necessary lengthening. Then, a forcible dorsiflexion accomplished the longitudinal splitting of that structure, making the vertical line of the letter "Z." The plaster cast was applied as usual. This technic has been found satisfactory only in very young children. Although the horizontal sections have been performed correctly, it has been impossible occasionally to split the tendon by manipulation without the risk of injuring the bone, the ankle, or the growing epiphysis.

Blind operations are not considered exactly scientific in their method, but I have observed cases of aseptic necrosis of the soft tissues of the posterior aspect of the leg, at the site of the opening for the lengthening of the Achilles tendon, in order to correct an equinus foot. This complication apparently is not very rare, especially in paralytic conditions due to defective circulation and trophic disturbances. I have tried to avoid it through improvement and care in surgical technic, varying the sutures, applying the casts without local pressure, and maintaining the foot elevated after the operation. Despite these precautions there have been complications, the most annoying of which was not the necrosis of the skin and subcutaneous fat, but the partial or total sloughing of the Achilles tendon with the subsequent postoperative adhesions which affect its function. I have had no cases of infection so far, and the healing has progressed slowly, but satisfactorily.

In using Bayer's method, the longitudinal splitting by manipulation was not always successful, perhaps because of the fear of going too far and possibly injuring other structures. In those cases it was necessary to finish the operation with the open technic.

In a series of cases the subcutaneous lengthening of the Achilles tendon was performed according to the following method:

METHOD

The patient is placed in a prone position with the feet over the edge of the operating table. While an assistant holds the foot in dorsiflexion the blade of the tenotome is introduced through the skin, over the region in which the lower horizontal cut of the letter "Z" is to be made (Figs. 1 and 2). The flat blade is pushed upward parallel to the tendon, between it and its mesotendon, guiding it very easily with the aid of the left index finger until it reaches the level of the upper horizontal cut of the letter "Z" marked previously with mercurochrome (Fig. 3), or any other dyeing antiseptic. The sharp edge of the blade is turned forward, cutting completely through the median point between the two borders of the tendon. The tenotome is drawn out, cutting the tendon longitudinally so as to make

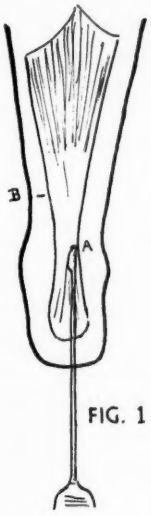

FIG. 1

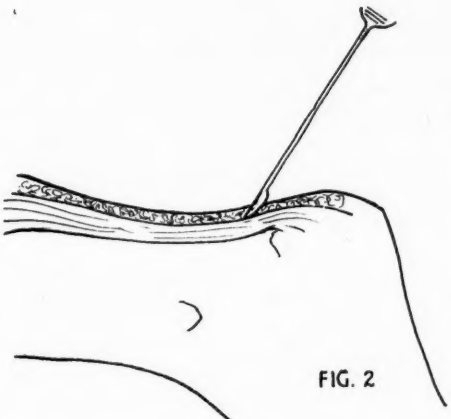

FIG. 2

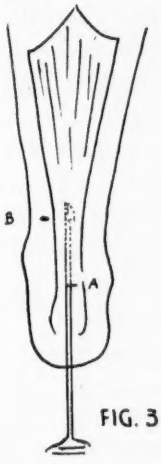

FIG. 3

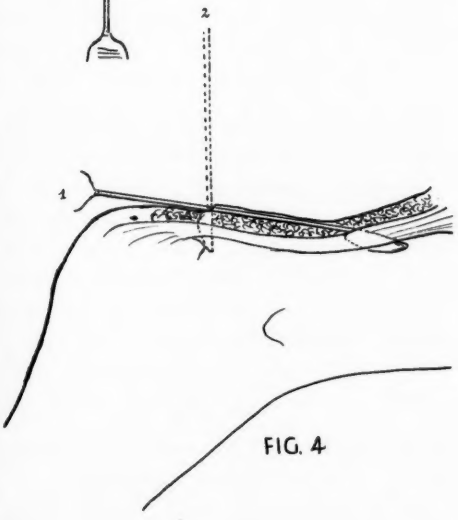

FIG. 4

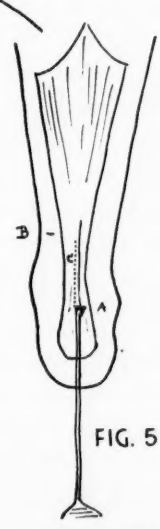

FIG. 5

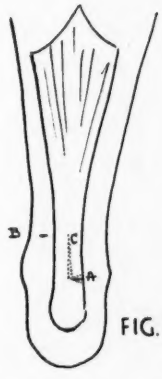

FIG. 6

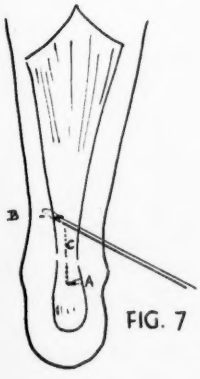

FIG. 7

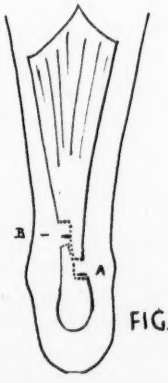

FIG. 8

FIGURE 1. The tenotome pierces the skin (A), which is in the level of the inferior transverse section of the letter "Z."

FIGURE 2. The point of the knife is over the posterior aspect of the tendon Achilles.

FIGURE 3. The tenotome is pushed upward between the skin and the tendon, guiding it with the left index finger until the point reaches the level (B) marked on the skin, where the superior horizontal branch of the letter "Z" will be cut.

FIGURE 4. The blade, which has been kept flat over the tendon, is twisted with the sharp edge turned forward and the tendon is pierced in its median part.

FIGURE 5. The knife is drawn back, cutting the tendon longitudinally in two halves. The blade is twisted (A) in order to sever the tendon from the longitudinal section (C) to its edge.

FIGURE 6. The sections (C and A) make a continuous line representing the letter "L." The tendon Achilles is tight only on the opposite side to that of the horizontal section.

FIGURE 7. The tendon is cut with the tenotome at the upper level (B) from the opposite edge to the median section (C), making the superior branch of the letter "Z."

FIGURE 8. As soon as the last section is made, the dorsiflexion is possible and the tendon is not felt.

the vertical cut of the letter "Z" (Fig. 4). The blade is twisted to make the lower horizontal section of half of the tendon (A) before removing the blade, cutting it from the longitudinal section (C) to the edge (Fig. 5). One may determine by feeling that the tendon Achilles is tight only on the opposite side to that of the horizontal section (Fig. 6). If it is tight over its whole width it means that the transverse incision is incomplete and must be completed. The last step of the operation is to introduce the tenotome at the upper level (B), and to cut the tendon transversely at the opposite half, from the edge to the center, completing the "Z" shape (Figs. 7 and 8). An assistant increases the dorsiflexion which becomes easier to do as the section advances. The dorsiflexion is free when the knife reaches the first incision (C). If the tendon is tight it means that the severance is not complete in the corresponding half, an experience which I had in the beginning.

This operation has the disadvantage of being blind, but the tenotome can be felt so easily under the skin that it is always under the control of the operator. It is performed in a very rapid and bloodless manner and, unless a broad tenon knife is used, it is not necessary to suture the skin. The results so far have been very satisfactory, with no failures, accidents, complications and no cases of non-union of the tendon.

It is advisable to prepare the patients for braces or later operations, when it may become necessary to correct an equinus deformity, particularly in cases of spastic and infantile paralysis in which other corrective operations frequently have to be done at the same time.

SUMMARY

A method is described for subcutaneous lengthening of the Achilles tendon. In the author's cases in which this method was used, no failures or complications have resulted.

RÉSUMÉ

Allongement souscutané du tendon d'Achille. Rélation preliminaire

Une méthode d'allongement souscutané du tendon d'Achille est décrite. Dans les cas presentés par l'auteur, dans les quels cette méthode fut employée, ne resultèrent pas des insuccès ni des complications.

ZUSAMMENFASSUNG

Subcutane Verlängerung der Achilles sehne einleitender Bericht

Es wurde eine Methode für subcutane Verlängerung der Achilles Sehne beschrieben. In dem vom Autor beschriebenen Fall, in welchem diese Methode verwendet wurde, war kein Misserfolg oder Komplikation zu verzeichnen.

RESUMEN

Alargamiento subcutaneo del tendon de Aquiles–noticia preliminar

Se describe un método para el alargamiento subcutaneo del tendón de Aquiles. En los casos que ha tradado asi el autor, no se han encontrado ni fracasos ni complicaciones.

RIASSUNTO

Allungamento sottocutaneo del tendine d'Achille. Relazione preliminare

E descritto un metodo per l'allungamento sottocutaneo del tendine di Achille. Nei casi presentati dall'A., nei quali tale metodo fu usato, non risultarono nè insuccessi nè complicazioni.

Congenital Dislocation of the Hip
A System of Treatment

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NEW YORK, NEW YORK

CONGENITAL dislocation of the hip and its prognosis has been a matter of endless discussion for the last fifty years. Some facts of basic value may be extracted from a perusal of the voluminous literature on the subject. They are as follows, in the order of their importance as they appeal to a serious student and an originator of a system of treatment.

1. Congenital dislocation of the hip is a serious crippling condition if left untreated.

2. Its disabling effects in childhood are negligible.

3. The disabling effects increase progressively through adolescence and adult life.

4. The untreated, unsuccessfully treated, or incompletely treated cases, which form a major group in that lamentable category, have been designated as the "adult hip cripple."

5. The patients treated after a certain period, no matter by what means, already present imperfect hips at the close of treatment and are, in the main, destined to join the "adult hip cripple" group.

6. The reason for this is that secondary changes, which make impossible a substantial *restitutio quo ante*, develop exactly in accordance with the time period during which the hip remains dislocated.

7. These secondary changes include maldevelopment of the acetabulum and the femoral head, capsular and muscular adaptations to the dislocated position and, most important, a structural alteration in the whole upper end of the femur.

8. This structural alteration in the shape of the upper end of the femur is an adaptive change of such a nature as to represent what is commonly referred to as "anteversion of the neck," of greater or lesser degree.

9. This anteversion is sometimes of negligible degree but is commonly the controlling factor in maintaining a reduction of the dislocation. It is largely a non-reversible structural change, unless artificially corrected, and it may, under suitable conditions, be corrected by comparatively simple means.

10. The age group in which a substantial *restitutio quo ante* is to be expected is sharply limited, and certainly does not extend beyond the age of three years.

Based upon these facts and upon the opportunity to observe and treat an adequate number of cases in the clinic of Royal Whitman at the Hospital for the Ruptured and Crippled, and at Bellevue Hospital, the author devised a system of treatment in 1928, which has apparently stood the test of time in his hands and in those of his associates. The object is the restoration of an anatomically, substantially perfect hip, and such an end-result may be attained in a large majority of cases under suitable conditions, which are as follows:

1. Reduction by simple manipulation, as much under the age of three years as possible.

2. Maintenance of the reduction in a plaster-of-Paris cast in an attitude of internal rotation sufficient in degree to counteract the structural anteversion of the upper end of the femur.

3. Correction of the structural anterior twist of the femur by simple manual supracondylar osteoclasis and outward rotation of the fractured lower fragment, midway in the six-months' period of plaster-of-Paris immobilization.

The main difficulty that the author has observed in consultations with colleagues is that, while they recognize that anteversion exists, they are not prepared to deal with it in the course of the six-months' immobilization period, but wait until its inimical effects are made plain in a prompt redislocation upon the removal of retentive dressings. This is a great mistake, since it means repeating a six-months' period of treatment. The author has had several such cases in which anteversion has been the cause of redislocation, and which subsequent reduction and osteoclasis, as above outlined, has served to effect a cure.

SUMMARY

Since 1928, the author has treated congenital dislocation of the hip by simple manipulation when the patient is as much under the age of three years as possible, and osteoclasis and immobilization by a plaster-of-Paris cast for six months. Basic facts concerning congenital dislocation of the hip are summarized.

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RÉSUMÉ

Luxation congenitale de la hanche. Une méthode de cure

De l'année 1928 l'auteur a traité la luxation congenitale de la hanche avec simple manipulation, quand le malade est le plus possible au dessous des trois ans, ostéoclasie et immobilization dans une cage de plâtre fin pour 6 mois. Dans cet ouvrage sont résumés les faits fondamentals concernants la luxation congenitale de la hanche.

ZUSAMMENFASSUNG

Angeborene Hüftgelenksverrenkung. Eine Behandlungs methode

Seit dem Jahre 1928 behandelte der Autor angeborene Hüftgelenksverrenkung durch einfache Manipulation am Patienten, der soweit wie möglich unter dem Alter von drei Jahren ist. Osteoklase und Ruhigstellung im Gipsverband für 6 Monate. Grundlegende Tatsachen die angeborene Hüftgelenksverrenkung betreffen, sind zusammengefasst.

RESUMEN

Dislocación congénita de la cadera. Una sistema de tratamiento

Desde 1928, ha empleado el autor como tratamiento en casos de dislocación congénita de la cadera manipulación simple, cuando el paciente falta lo más posible de tener tres años de edad. Después se emplean osteoclasis e inmovilización durante seis meses. Se da un resumen de datos fundamentales sobre la dislocación congénita de la cadera.

RIASSUNTO

Lussazione congenite dell'anca. Un metodo di cura

Dal 1928 l'A. ha trattato la lussazione congenita dell'anca con semplice manipolazione, quando il paziente è quanto più possibile al di sotto dei 3 anni di età, osteoclasi e immobilizzazione dell'arto in gesso per 6 mesi. Sono riassunti i fatti fondamentali riguardanti la lussazione congenita dell'anca.

Bone Formation in Abdominal Scars

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TUMEFACTION in abdominal scars is a fairly common finding. Keloids, endometrial tumors, and desmoids are more frequently encountered. The occurrence of bone formation in abdominal scars is much less frequent.

Clark reported a hard mass the size of a walnut occurring in a paramedian abdominal scar. On cross section both bone formation and adenocarcinoma were found.

Jones found an irregular bony formation in a hernia scar, which he attributed to pricking of the pubic bone with the needle while suturing the incision, thus transplanting bone. He made a complete review of the literature and emphasized the rarity of such formation.

The following case is reported because of the unusually large and regular formation of bone in an abdominal scar. The location of the lesion made direct bone transplant almost impossible. The use of absorbable suturing material in the wound eliminated irritation as an etiologic factor, as has been suggested when material resembling silk has been used.

REPORT OF CASE

A. H., a man, aged 61, was admitted to the Paris Hospital July 2, 1939. During a previous admission on June 27, 1939, a complete study had been made and laparotomy was recommended for pathology in the right upper quadrant. The preoperative diagnosis was deformity of the pylorus, chronic appendicitis and chronic cholecystitis.

First Operation.—A high right paramedian incision was made on July 3, 1939, which revealed the following: The pylorus was thickened and located high under the liver, with some stippling of the pylorus and the duodenum. The gallbladder walls were thickened and the gallbladder was found to be 6 cm. in length, completely buried in adhesions involving the duodenum and the hepatic flexure of the colon. The cecum was very large and adherent. The appendix was of the obliterative type, 7 cm. in length, buried deeply into the serosa of the cecum, and retrocecal in position. Appendectomy and cholecystectomy were performed. The patient made a prompt and uneventful recovery.

Microscopic Examination.—The specimens removed showed marked muscular atrophy of the appendix and chronic ulceration of the gallbladder mucosa.

Second Operation.—On April 29, 1940, ten months following operation, the patient returned to the hospital because of a hard mass in the old abdominal scar. Visualization of the gastro-intestinal tract revealed the mass to be confined entirely to the abdominal wall. On May 1, 1940, the calcified mass, shown in Figure 1, was removed from the abdominal scar after infiltrating the tissues with 1 per cent novocain solution.

Fig. 1. Photograph showing calcified mass removed from abdominal scar.

The mass was found to be closely adherent to the fascia and on the under-surface to the muscle. A microphotograph of the decalcified section is illustrated in Figure 2.

Microscopic Examination.—The section appeared relatively thick, but may be identified as true cancellous bone instead of merely calcified substance, *i.e.*, the picture resembled that of anastomosing osseous trabeculæ and medullary spaces which have contained medullary substance, etc. The specimen was viable or semi-inanimate, and, so far as could be determined,

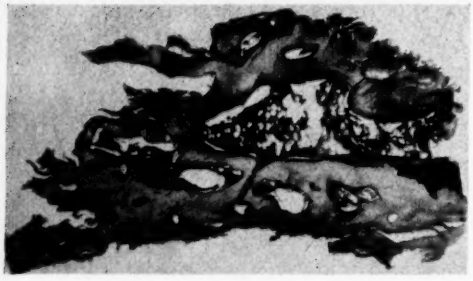

Fig. 2. Microphotograph showing decalcified section.

was not a true sequestrum. There were no areas of pus-cell massing, tubercle bacilli, stricture or neoplasms. From what could be seen in the section, the tissue would undoubtedly be regarded as heterotopic in an abdominal scar not adjacent to bone or directly involving it.

SUMMARY

A case is reported of bone formation in a paramedian scar ten months following appendectomy and cholecystectomy. The location of the lesion made bone transplant almost impossible. Absorbable suturing material was used in the wound, irritation as an etiologic factor thus being eliminated.

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RÉSUMÉ

Formation d'os dans une cicatrice addominale

Un cas de formation d'os dans une cicatrice paramédiane, 10 mois après appendectomie et cholecystectomie, est réporté. Le placement de la lésion rendut la transplantation d'os presque impossible. Matière pour suture absorbable fut employé dans la blessure, avec ça ayant éliminé l'irritation comme facteur étiologique.

ZUSAMMENFASSUNG

Knochenformation in einer abdominellen Narbe

Es wird ein Fall von Knochenbildung in einer paramedianen Narbe, welcher 10 Monate nach einer Appendectomie und Cholecystectomy folgte, beschrieben. Die Lage der Laesion machte ein Knochentransplant unmöglich. Absorbierendes Nahtmaterial wurde in der Wunde verwendet, welches Irritation als etiologischen Faktor ausschloss.

RESUMEN

Formacion de hueso en cicatriz abdominal

Se describe un caso de formación de hueso en una cicatriz paramediana diez meses después de apendectomía y colecistectomía. El sitio de la lesión ha hecho casi imposible el trasplante de hueso. Se empleó en la incisión materia absorbible para suturas para evitar irritación como factor etiológico.

RIASSUNTO

Formazione di osso in una cicatrice abdominale

E riportato un caso di formazione di osso in una cicatrice paramediana 10 mesi dopo appendicectomia e colecistectomia. Data la sede della lesione il trapianto osseo fu quasi impossibile. Fu usato nella ferita materiale da sutura assorbibile, essendo in questo modo eliminata l'irritazione come fattore etiologico.

The Medico-Legal Aspect of Injuries to the Head

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DURING my forty years of practice as a physician dealing with diseases and injuries of the head, I have become increasingly aware of the honest difficulties encountered by both judges and juries in deciding the true merits of any medico-legal case. As a civilian surgeon, a former oculist and aurist for two transcontinental railroads, and a member of the Brain and Spinal Surgery Division of the Medical Corps of the Army during the World War, I have witnessed errors in diagnosis, prognosis and treatment which, though honestly made or forcibly disregarded, have resulted in great injustice to the injured. I have also known erroneous verdicts rendered because important facts and data were not introduced or could not be admitted in court.

I have listened to many questions and much court testimony misleading and irrelevant to the issue, mystifying to a lay jury, and beclouding the real purpose of the litigation. Much of this is due (1) to the inability of attorneys to grasp the medical and surgical complexities of injuries to the head; (2) to the legal technic supposed to be necessary to win a medico-legal case; and (3) to the difficulty, no doubt, which some medical experts find in entirely detaching themselves from the interest of the plaintiff or defendant for whom they are testifying.

It is not my intention to go into all the phases of known injuries of the head or their possible disabling or disfiguring results, but to segregate and expose the debatable medico-legal features of certain types of head injuries. I will endeavor, therefore, to emphasize certain well-known and proved facts concerning injuries to the head, particularly as they are directly or indirectly related to temporary or permanent impairment of the injured person, his physical and mental outlook, his personality, his sight and his hearing. I will further point out the necessity for considering an injury from its incipiency, both before and after entering the hospital, in order to get a clear picture of the case and to properly evaluate the probability of delayed complications, as they are now observed, recognized and classified by modern brain surgeons. Studies made in several of the largest hospitals in this country and by myself will be quoted to support the claims and conclusions made in this presentation of the subject. It is my purpose to quote from the latest and best authorities, as well as from my own personal experiences, in order to justify the earnest effort I am making to sift the chaff from the wheat, the true from the false, and the unimportant from the real in medico-legal practice.

EARLY OBSERVATIONS

To the minds of laymen and of some physicians not conversant with skull and brain injuries, a skull fracture implies disaster or even death. Fractures of the skull have interested physicians from the time of Hippocrates, 500 B.C. Many theories have been propounded to determine the mechanism of fractures, particularly those occurring indirectly, classically called "fracture by contre-coup."

The author, in 1900, fully reviewed the literature on the subject from the earliest writings and was astonished not only by the

scientific reasoning used by many of the early observers, each contending that his theory was the correct one, but also by the lack of consideration for the differences between a freshly detached skull and the heavily covered living skull, filled with a resilient content, the brain floating in the cerebrospinal fluid and attached to the resisting spinal column and neck. Although bodies were thrown out of windows upon hard surfaces and corpses' skulls were battered to enable further studies, not much was definitely determined. The elastic vault set upon a rigid base, together with the divergent effects of the architectural buttresses of the skull, added complexity to the problem and resulted in a multiplicity of conclusions. Experience has proved that the location or extent of a fracture does not necessarily determine its seriousness or its ultimate results. The medical or surgical care received determines, in a large part, the seriousness of the injury, the length of time for recovery and the complications.

POST-TRAUMATIC COMPLICATIONS

From the medico-legal aspect, it is interesting to note that post-traumatic complications were found to have a striking similarity in several series of cases compiled from records of three of the largest hospitals in this country. The studies revealed that the condition of injured persons who had experienced a protracted period of unconsciousness lasting several days, accompanied by severe headaches, low pulse rate (60 or less), ophthalmoscopic and manometric indications of intracranial pressure, and who had been in hospitals from four to six weeks or longer, followed a definite course.

The permanent complications are: persistent headache, change of personality (of the depressed and excitable type), fatigue (both mental and physical), lapse of memory, dizziness, faintness, and occasional epileptiform seizures. Permanent sufferers from head injuries constituted 67 per cent of the cases that could be traced during or after a period of ten years. They were unable to get fair or adequate compensation in or out of court because these various permanent complications usually appeared after settlement or litigation had ended.

Post-traumatic neuroses are next in line for medico-legal consideration. Most of these neuroses must be held to be only the result of protracted convalescence and anticipation of monetary compensation, despite the sympathetic picture the patients make in courts through a pseudo-voluntary attempt to magnify the injuries and symptoms for which the plaintiff is contending. Such injuries and symptoms disappear, in whole or in part, with the rendering of a verdict which, in the majority of cases, is far beyond an equitable amount.

In a court of justice the question concerns not only the patient's suffering, his loss of time and the expenses incurred, but his actual and future disabilities. These can be prognosticated and estimated fairly accurately from his history and present medical and surgical findings. There are, of course, too many possible head injuries, with or without skull fractures, to be included in a brief outline intended solely as a medico-legal yardstick to promote an honest basis for settlement.

CONGENITAL DISABILITIES

Before taking up the different injuries which usually go to court, I wish to call attention to the congenital deformities, anatomic and functional, which knowingly or unknowingly have been brought up for compensation after injuries. Among these congenital deformities are deep fronto-temporal fossæ, atresia of the cohanae, contracted visual fields, partial or total amaurosis (eyes with part or no sight, yet apparently normal), color blindness, progressive inherited deafness (partial or total in either ear or both), loss of smell and taste due to intranasal diseases, and mild cases of

anterior poliomyelitis. These pre-existing conditions should be ruled out or verified wherever possible at the time of taking the medical history of the injured person. Without knowledge of these conditions, injuries cannot be honestly estimated in court.

SKULL FRACTURES

Any injury to the head, slight or severe, may affect the contents of the skull as well as the organs of sight and hearing. If certain symptoms, such as lowered pulse and respiration, definite paralyses, and the group of intracranial pressure symptoms (except in epileptic or hydrocephalic cases) are allowed to develop and remain without surgical interference, a high rate of mortality must be expected, and of those who survive many will have brain injuries in spite of delayed operations.

It is neither expedient nor safe to delay a life-saving measure for want of X-ray confirmation of fractures of the skull. Despite the well-known fact that fractures of the base are a possible forerunner of serious brain degeneration, many are followed by no apparent acute or chronic injury to the brain. On the other hand, serious injury to the brain may occur in cases in which fracture cannot be detected. Most fractures of the vault are accompanied by fractures of the base. Depressed fractures with symptomatic brain trauma should always be promptly elevated, unless it is impossible to do so because of shock. Fractures without apparent brain injury should not be elevated unless they involve the sinuses.

The mechanism of indirect fractures of the skull has no bearing on the medico-legal purpose of this treatise, since the nature and extent of the injury, temporary or permanent, and not the manner of occurrence are the main issues under consideration. That subject, therefore, will not be gone into except as it may relate clinically to injuries to sight and hearing. In those cases in which a witness is called upon to determine how an injury of the skull occurred, or to identify the weapons which caused the injury, whether self-inflicted or by a fall or by some other person, none of the known theories concerning the mechanism of fractures alone can be depended upon to answer those questions. Neither can the laws of physics concerning velocity, gravitation, cohesion or dissolution be applied to any logical conclusion. The case must be viewed from every angle to determine when, where, and how the injuries occurred.

In fractures of the human skull, one must consider many kinds of skulls, bone formation, the age factor, external findings indicating the probable place of impact, the difference in the coverings of the skull (*e.g.*, between men and women). One skull might be fractured but another might not by the same blow. External lacerations establish the possibility of the number of blows struck. Also, supposing a man has fallen from a high window onto a grate, he might have cuts or bruises approximating the spaces of the grate. A child thrown onto a pavement and striking the side of his head might exhibit only a caved-in parietal bone. It is interesting to note that when a blow is struck at the osteogenic center of any bone of the skull in adults, a stellate fracture generally occurs at that point.

A normal individual falling from his own height onto a rounded surface or object seldom fractures his skull seriously. Sensing the fall, he usually protects himself with his arms and hands, thus breaking to a great extent the force of the fall. Fractures occurring from falls onto the frontal or occipital bones are likely to be more serious and complicated, probably because of the impact being transmitted through the longitudinal axis (bursting theory), producing indirect fractures. Women suffer less than men when striking almost any portion of the skull because of the greater protection afforded by their hair. The acquired momen-

tum from an upright position is seldom enough to overcome this natural protection.

SURVEY

In order to ascertain how often fractures of the skull take place in individuals falling from their own heights, a type of individual prone to hard falls was selected for study. Since epileptics fall without warning so hard that they can be heard striking the floor from one end of their ward to the other, a survey was made of all the epileptic institutions in the United States.

The following questionnaire was sent to these institutions. The results follow the questions.

In order to assist in a further study of the mechanism of direct and indirect fractures of the skull and injuries to the brain, will you kindly answer the following questions?

1. How many epileptics do you usually have in your institution? *Grand total, 10,977.*
2. How many fractures of the skull in these epileptics do your reports show have been sustained from falls? *Grand total, 41. (Probably great many more undiagnosed.)*
3. What was the nature of the fractures and injury to vault or base or both? *Mostly base. Definite and accurate information not obtainable.*
4. Were any of the injuries to the skull or brain fatal? If so, how many? *15 in all. This covers a period of 10 years or more for each institution.*
5. Have you ever known of a death in an epileptic or any other subject caused by fracture or brain injury sustained from a fall from their own height (whether or not striking an object while falling)? Give number and brief detail. "*No*" *is the emphatic answer from all of my correspondents, except, of course, for the fifteen epileptic cases acknowledged and reported here.*
6. Are your answers based on clinical symptoms only or X-ray findings as well? *Both.*

Seventy-four answers were received covering 10,977 cases of epilepsy recorded over a period of ten years or longer. Of these 74 answers, 16 were rejected for incompleteness or because they were not pertinent to the intent of this survey. Out of this large number of cases, 41 fractures were reported, with 21 deaths following falls on the head. Of these 21 fatalities, 6 were found at autopsy to have been due to cerebral hemorrhage and not to fracture, leaving only 15 fatalities due to falls and fractures. It is interesting to note that there were only slight abrasions or cuts on the scalp among these few fatal cases, and that old fractures of the base, apparently without clinical symptoms, were discovered at autopsy.

These 15 deaths took place in 8 different institutions, having a total of 3,370 inmates, leaving 7,607 epileptics in 50 other institutions without a single death from falls or fractures during the same period. If epileptics can fall, week after week, and month after month, with so few deaths and unsuspected fractures, then there is very little likelihood that normal individuals will suffer serious and fatal injuries as a result of an ordinary fall on the head from their own height, no matter where or how they may fall. Either applied force to a skull or velocity and strong impact against a solid and resisting object is required for fractures. It has been recorded in one of our largest epileptic institutions that fatalities occurring from fractures were those in which the subject had struck the frontal or occipital bone upon such resisting surfaces as cement or hardwood floors.

There are 52,000 epileptics in the United States, according to the estimate of the United States Public Health Service. Most of them fall at some time or other. As-

suming that one-half of these epileptics average one hard fall a month (which is usually the case), the result would be 3,072,000 falls a year, or 30,720,000 in ten years. The 15 deaths resulting from such falls is infinitesimal but, no doubt, correct as we seldom, if ever, hear of death from a skull fracture in an epileptic in private life or in anyone falling from his own height. In fact, Question No. 5 of my questionnaire was answered negatively in every instance (with the exception of the 15 deaths noted in Question No. 4). Death resulting from fractures of the skull is seldom, if ever, experienced or suspected except in a court of justice, where the cause of death, presumably by some form of violence, is to be determined.

The conclusion may be drawn that few, if any, normal persons ever suffer fatal skull fractures in a fall from their own height. Their natural reaction of self-protection (and in women their hair) prevents serious fractures. In the few cases in which such fractures are known to have occurred there were no scalp injuries except when the head struck some sharp cutting object or surface.

CONDITIONS CAUSED BY HEAD INJURIES

FRACTURES OF THE BONES OF THE ORBIT FOLLOWED BY TRAUMATIC ENOPHTHALMOS. This condition is of medico-legal importance because it causes great disfigurement and deformity, particularly among women. It involves particularly the orbital margin. Extensive injuries and fractures may cause shrinking and cicatrization of the orbital tissues, atrophy, escape and displacement of the fat in sinuses, all leading to a retraction of the eye into its socket. Because of the force necessary to produce a fracture of the orbit, directly or indirectly, all other injuries to the eye, even blindness itself, may be encountered in these cases. Should enophthalmos be the only claim for damages, the plaintiff is certain to recover an amount far beyond the actual disability sustained if the case is taken to court. An early settlement out of court is, therefore, advantageous.

HEMORRHAGES INTO THE ORBIT.—These usually follow direct injury to the bones of the face with or without fracture of the orbital walls. They also occur in basal fractures. The principal symptoms of the first group are exophthalmos, with discoloration of the lids but without any perceptible impairment of sight. In the second group, the hemorrhage may be great enough to push the eye out of its orbit and prevent the closure of the lids. The pressure upon the optic nerve may be so great as to impair the vision even to the point of blindness. It is, therefore, imperative to relieve pressure.

TRAUMATIC ANEURYSMS WITHIN THE SKULL FOLLOWING FRACTURES AT THE BASE. These aneurysms occur in arteries within and without the brain and are usually due to a fracture at the base with a rupture of the internal carotid artery into the cavernous sinus. The most frequent and early symptom is exophthalmos (bulging, pulsating eye). Care should be used in differentiating the post-traumatic from the idiopathic group. Pulsating exophthalmos also may occur with an encephalocele or a lymphangioma of the orbit. When these cases are brought up in court it is important to differentiate them. Most of them can be cured by surgical means, and more rarely by spontaneous involution.

EMPHYSEMA OF THE ORBIT.—Emphysema (air in the orbit) occurs when a fracture involves the wall of any of the nasal sinuses. The air is usually introduced by blowing the nose after the injury. The condition indicates that there is a fracture of the orbit. The bulging eye will subside gradually, providing there is no orbital infection or refilling with air before healing has taken place.

CONTUSION OF THE EYEBALL.—Contusions of the eye with or without direct or indirect

rupture of the external coats or capsule may result in immediate disorganization of the eye structures or gradual disintegration of some parts of the eye, both affecting the sight. This loss will depend upon the parts injured and the nature of the injury, and may mean the loss of an eye which might otherwise have been fairly useful. The danger of sympathetic ophthalmia may necessitate the removal of the injured eye to save the other eye. This serious event is often the cause of malpractice and damage suits.

Sympathetic iridocyclitis or ophthalmia is a disease much more easily prevented than cured. When there is any indication for enucleation of the injured eye, no time should be lost in operating. Even then it may be too late to save part or all of the sight in the secondarily affected eye. Enucleation of the injured eye is the only certain prophylactic treatment for sympathetic ophthalmia, and too often it is delayed because the patient or his family is hesitant to consent to removal while it still possesses enough sight to give false hopes of recovery in the face of recognized and alarming symptoms in the good eye.

Sometimes the victim is suffering from a former lesion which has greatly impaired the sight of the eye. In such cases it is not at all improbable that having had a good companion eye, he has not properly evaluated the previous loss of sight of what he calls his bad eye, and may expect unwarranted compensation for a former injury now brought sharply to his attention. It is not at all uncommon to find individuals who actually did not know that they had an almost blind eye until closing one eye to fire a gun or rifle. Color blindness also may remain undetected until adult life.

Traumatic dilatation, contraction and irregularity of the pupil have given cause for litigation. Such conditions may be congenital or the result of disease other than injury. Dilatation may be found with enlarged cervical glands or scars produced by suppuration or operation, syphilis, disease of the choroid, retina and optic nerve, or may be due to previous inflammatory conditions of the interior of the eye, with iris adhesions. This condition can be differentiated from injuries to the iris by lacerations of the sphincter with hemorrhage, the shape of the pupil and the reactions to light, accommodation, etc.

Contraction of the pupil is usually not as constant or lasting as dilatation and often escapes the attention of the injured. When permanent, it is evidence of former inflammation of the iris, spasm of its sphincter or brain injury. An attempt at dilatation with a mydriatic will assist in determining the proper diagnosis and cause of the miosis.

Severe hemorrhages within the eye, particularly in the vitreous, are sometimes very slow to absorb and may mask for a long time serious injuries to the retina, choroid or optic nerve. For this reason correct estimate of the injury or loss of sight is impossible until absorption is complete and tests have been made to ascertain the seriousness and permanence of the disability. Since all of these possible results from blows and injuries to the eye have been the object of medico-legal controversies, they should be carefully studied in order to establish what relation, if any, they have to the claims made by the injured.

INJURIES TO THE NERVES AND EXTRA-OCULAR MUSCLES IN INJURIES OF THE SKULL. After considering the possible cranial injuries already discussed, it is important to determine whether any injury has been done to the external ocular muscles, which may mean permanent disability and disfigurement. Three nerves supply external eye muscles but the sixth (abducens) is the one usually involved in cranial injuries. The seventh (facial) may be injured either alone or jointly with the sixth, and in severe transverse fractures at the base both facial nerves may be involved. If the third nerve (oculomotor) is injured with the sixth, a fracture

of the petrous portion of the temporal bone probably has occurred, for these two nerves lie close together in that region. The other nerves and muscles are seldom affected.

Paralysis of the external rectus muscle through injury to the sixth nerve causes the eye to turn inward and diplopia (double vision) ensues. An operation upon this muscle when paralyzed can correct only the extreme internal rotation, enabling the patient to look straight ahead. In any other direction double vision is experienced. Any judgment rendered on the basis that the operation has corrected the injury is based on false premises and the damages agreed upon should be commensurate with the permanent handicap of diplopia and not assumed recovery.

In case the third nerve is paralyzed, as well as the opposite side of the body, the lesion will be found in that part of the brain called the peduncle. In paralyses of these nerves (third to the seventh) the probability of a basal or orbital fracture must have first consideration, for cortical and nuclear injuries may exist alone. Injuries and permanent disfigurements resulting from loss of nerve function to these muscles naturally have a profound effect upon the judge or jury, although the loss to the injured is not nearly as important as other less evident forms of disability.

LESIONS OF THE OPTIC NERVE IN FRACTURES OF THE SKULL.—An immediate and permanent impairment of vision following a skull injury is usually a serious condition. Anatomically, there probably has occurred either an injury to the optic nerve caused by fracture of the optic canal or severe hemorrhage in the optic nerve itself. Also blood may enter the sheath of the optic nerve following fractures of the base with or without fractures of the optic canal.

Examination of the optic nerve will indicate the seriousness of the injury. Although fractures of the optic canal usually occur in fractures involving the frontal bones or margins of the orbit, they may result from "contre coup." Immediate examination of the fundus may not show any serious abnormality, but within a few weeks partial or total blindness may gradually develop.

Atrophy of the optic nerve progresses toward the brain, hence the severity of injury to it cannot be determined immediately. Neurologic and perimetric field tests soon determine whether the defective vision is to be permanent or temporary, partial or total. Partial or total blindness resulting from fractures involving both optic canals and the sella turcica may be recovered, despite the apparent seriousness of the injury. The lesions here discussed are those not masked by intra-ocular hemorrhages arising from other injuries to the eye; these will be considered later.

LESIONS OF THE CENTRAL OPTIC TRACT AFTER INJURIES TO THE SKULL.—All optic fibers can be affected by cranial injuries. The chiasm, the optic tract, the intracerebral bands and the cortical visual centers in the occipital lobes may be harmed in several ways. In the majority of cases a neurologic examination will determine the location of the injury. If, for instance, there is a bitemporal blindness of both eyes, or blindness of one eye with temporal blindness in the other, or blindness in both eyes, it can be assumed that there has been an injury to the chiasm or that both optic nerves have been lacerated in their course from the chiasm to the eye. All lesions above the chiasm produce homonymous hemianopia. Lesions of the visual centers in the cortex of the brain (occipital region), are quite frequent in injuries of the brain and skull. When the right visual center is injured, the hemianopia is on the left side. If destruction is incomplete, no ophthalmoscopic defect appears. Cases of traumatic homonymous hemianopia with contraction of the remaining field suggest superimposed traumatic neuroses and hysteria—a point to be

considered in court when estimating the amount of injury sustained.

PTOSIS OR DROOPING OF THE EYELIDS.—Drooping of the eyelids is a very disfiguring facial defect. The condition may be congenital or the result of any disease causing paralysis of the muscles that elevate the lids, meningitis, syphilis, alcoholism, acute occupational poisoning and infection. When, however, it is due to trauma, it deserves medico-legal consideration.

Ptosis can be acquired easily, both organically and functionally, from injuries to the brain, the orbit and its contents or from fractures of the skull affecting the third nerve. There should be careful inquiry into the history of the patient previous to the accident and a thorough medical examination to determine whether the ptosis is the result of the injury or is due to any of the other well-known causes which have no possible relation to any injury. Hysteria may produce ptosis, but always in both eyes and of a certain lax type, which facts differentiate it from paralytic forms, particularly when it is accompanied by disturbance of the visual fields.

FRACTURES OF THE ANTERIOR WALLS OF THE FRONTAL AND MAXILLARY SINUSES.—These facial disfigurements are seldom serious in themselves, but make a marked impression upon a jury. In cases in which there existed a chronic infection of the sinuses previous to the injury and in which the external fracture extends into the orbit or the skull, secondary infection and serious complications may occur in both of these cavities. It takes a much greater force to break the anterior walls of a frontal sinus than that of the maxillary. Greater care should be exercised in fractures of the former, as the possible complications arising from such an injury might be much more serious.

FACIAL PALSY OR PARALYSIS (RIGHT OR LEFT SIDE OF THE FACE).—Like enophthalmos, ptosis and disturbance to the ocular muscles, paralysis of the face is one of the cosmetic complications of injuries to the head certain to be brought to court for settlement. Fortunately, these cases are seldom of a permanent nature. They occur in fractures of the temporal bone, with or without any injury to either labyrinth or cochlea, and ameliorate gradually when the inflammation or edema compressing the facial nerve subsides. Seldom is the nerve so injured or torn as to result in a permanent paralysis. If, however, this should be the case, an anastomosis with either the hypoglossal or spinal accessory nerve will restore the lost function in the course of a few months. Therefore, the amount of damages to be recovered in either case will be problematic, depending principally upon time or surgical intervention. The results in either case are most satisfactory, though it may take months to regain complete function of the injured nerve and normal facial expression.

LOSS OF HEARING.—In partial or total loss of hearing after a head injury, inquiry should be made into the patient's hearing before the accident. Several pre-existing conditions may cause further loss of hearing in a partially deaf patient. There are some forms of partial deafness which would eventually lead to total deafness, but which, through shock or head concussion, progress rapidly and prematurely. It seems fair that such pre-existing conditions should receive proper consideration in medico-legal cases and that just allowances should be made for them by the judge and the jury.

VERTIGO OR DIZZINESS.—Dizziness may be one of the early or late complaints as a result of head injuries, and sometimes the only cause of litigation. It should be remembered that in any injury where dizziness is one of the early and important symptoms, a protracted recovery must be expected. Any injury to the labyrinth or inner ear, from either hemorrhage, concussion or fracture, may be superimposed by a neurosis or

hysteria before the patient can fully recover. The dizziness may be due to injury of either or both labyrinths or to brain concussion. If the labyrinths are injured a protracted recovery must be anticipated. Once compensation has taken place, there will no longer be any cause for dizziness. In cases in which the cochlea is also injured, deafness accompanies the dizziness. Well-known and reliable ear tests, however, will settle these issues. Dizziness unsupported by clinical findings that the labyrinth or inner ear has been injured does occur and in some cases persists for a long time, but will finally cease. Close observance of the individual's movements will greatly assist in determining whether his symptoms are real or superimposed. It is, therefore, of medico-legal importance that the above conditions and complications be carefully noted, since in one case the injured person will recover completely and in the other he will not only be incapacitated for six months or longer, but will also lose his hearing on the injured side.

COMMENTS

From the foregoing it becomes apparent that many verdicts are rendered too early to compensate the injured individuals for their future disabilities in any adequate manner. On the other hand, some verdicts far exceed the seriousness of the disability, because the juries are more impressed by what they see in the courtroom than by what they hear. This is particularly true in the presence of roentgenograms, facial deformities, hysteria, superimposed neuroses and other forms of voluntary or involuntary exaggerations. It is evident that in order to determine the approximate amount of present or future disabilities likely to follow any serious injury to the head, the honest opinion of competent medical examiners is necessary. They must be qualified not only to testify, but also to detect previous conditions and lesions from among those enumerated in the complaint.

It has been conclusively proved by my questionnaire that the force required by a normal adult in falling from his or her own height is not great enough to produce fracture of the skull, except in such exceptional instances when the injured is unconscious or unable to use his protecting mechanism in the fall. Further, such individuals do not suffer any lacerations of the scalp, unless also explainable and evident. It has been made clear that roentgenograms are misleading as to the importance of the fractures they may reveal, and in many instances they have a tendency to exaggerate greatly the extent of such fractures.

It is hoped that this presentation will prove the futility of asking hypothetical questions of a medical expert, with the request that they be answered in the negative or affirmative. Too many intricate circumstances not gone into for the sake of brevity preclude in most instances the possibility of such unqualified answers. It is also evident that if the contending parties were willing to study and evaluate the nature of resultant injuries (as well as causes and responsibility), satisfactory settlements could be reached more easily out of court than by trusting to emotional display in the courtroom for larger gains.

Malingering is as difficult as denying one's own finger prints. No individual is clever enough to pass the many tests that any medical examiner can put to him to expose deceit. Therefore, all findings in any medico-legal case should be based upon as exact medical knowledge and proof as is possible.

SUMMARY

The medico-legal aspects of certain types of head injuries are discussed from the viewpoint of the permanent and temporary disabilities to be considered in court action.

Post-traumatic complications are described and differentiated from congenital disabilities. The question of how many falls produce fractures is considered, results of a survey among 10,977 epileptics being cited. Several conditions produced by head injuries are discussed in detail, including symptoms, treatment, likely recovery, emergence of unsuspected former injuries, with special emphasis upon permanent disability and disfigurement justifying court action. It is recommended that because juries may easily be misled by emotional display and less by serious, yet readily seen injuries, the opinion of competent medical examiners is essential to a fair settlement.

RÉSUMÉ

L'aspect médico-légal des traumatismes de la tête

Certains types de traumatismes de la tete sont discutes du point de vue légal et de l'incapacité temporaire or permanente qu'ils entrainent. Les complications, post-traumatiques sont etudiées et differenciees d'encapacites congénitales. Les chutes entrainent, souvent des fractures. Dix mille cas d'epilepsie furent etudiés. Cas traumatismes sont discutés en detail du point de vue des symptoms, du traitement, du pronostic des complications tardives. Une certaine emphase est donnee aux conditions qui justifient un recours aux tribunaux. La justice demande que les faits saient interpretes aux tribunaux par des experts competents.

ZUSAMMENFASSUNG

Die gerichtlich-medizinische Seite von Kopfverletzungen

Die gerichtlich-medizinische Seite von gewissen Kopfverletzungen ist besprochen mit Rücksicht auf die dauernde und vorübergehende Arbeitsunfähigkeit, wie sie vor Gericht in Betracht kommt. Unfallsfolgen werden beschrieben und unterschieden von angeborner Dienstunfähigkeit. Die Frage, wie oft ein Fall einen Knochenbruch nach sich zieht, wird erörtert unter Zugrundelegung einer Umfrage unter 10'000 Epileptischen. Mehrere Zustände, die Folge von Kopfverletzungen, werden ausführlich besprochen nach Symptomen, Behandlung, warscheinlichen Ausgange, Erscheinen von unvermuteten, früheren Verletzungsfolgen unter besonderer Betonung von dauernder Dienstunfähigkeit und Entstellung mit Anrecht auf gerichtlichen Entscheid. Weil Geschworne leicht durch rührselige Handlungen und durch weniger ernste, aber leicht sichtbare Verletzungen irregeführt werden, ist die Ansicht von zuständigen medizinischen Prüfern entscheidend für einen gerechten Entscheid.

RESUMEN

El aspecto medico-legal del traumatismo de la cabeza

El aspecto médico legal de ciertos tipos de traumatismos son discutidos del punto de vista del impedimento permanente o temporario que sera juzgado por el tribunal de justica.

Complicaciones son analizadas y diferenciadas de las lesiones congenitales.

La question de que cuantas caidas producen fracturas recibe especial consideracion y el resultado de un estudio de 10.000 epilepticos es publicado.

Varias condiciones producidas por daños á la cabeza son discutidas en datalles, incluyendo sintomas, tratamiento, prognostico, emergencias en casos de antiguos daños que no fueron sospechados, con especial enfasis en las lesiones resultando en impedimento permanente y deformacion justificando asunto judicial.

Recomiendase que por razon de que los

juzgados pueden hacerse influir por actos de emociones, hasta el grado que daños ligeros ó pequeños pero aparente, necesitan el criterio medico de expertos para obtener un jucio justo.

RIASSUNTO

L'aspetto medico-legale di ferite alla testa

Si discutono gli aspetti medico-legali di certi tipi di traumi al capo dal punto di vista di ingiuria temporanea e permanente d'importanza legale. Complicazioni pos-traumatiche vengono descritte e differenziate da difetti congeniti. Il problema di quali cadute producano fratture viene considerato, il risultato di una investigazione fra 10 000 epilettici è citato. Certe condizioni risultate da traumi al capo sono minutamente discusse includendo sintomi, terapia, prognosi, il divenire attivo di traumi vecchi e non sospettabili, con speciale riguardo alla disabilità e menomazione permanenti che giustifichino azione legale. Vien dimostrato che l'opinione di competenti medici è essenziale per una soluzione equa poichè la giuria puó essere facilmente influenzata da ragioni emotive e da lesioni che sono meno serie ma piú vistose.

INTERNATIONAL COLLEGE OF SURGEONS' CREDENTIALS BOOKLET

The International College of Surgeons' Credentials Booklet just issued to members is a "surgical passport" for post-graduate study throughout the world (see page 471).

Sarcoma of Muscle

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A STUDY of the literature shows that sarcoma of muscle has received but scant attention, when compared with sarcoma of other tissues, *e.g.*, that of bone. It would appear that, with a better understanding of the clinical course and the results of treatment, sarcoma of muscle might be in the category of the more hopeful forms of mesoblastic malignant disease. This paper is based on a complete study of a small series of cases occurring in a single surgical clinic.

DIAGNOSIS

From an analysis of recorded cases there appears a slight predilection for the long muscles of the thigh and upper arm. No muscle is exempt.

There is little difficulty in making a confident preoperative diagnosis, unless the tumor is situated in an unusual site (Fig. 1). An intramuscular hematoma must be excluded, but in no case did this seriously enter the clinical picture. On theoretical grounds a gumma must be ruled out.

The microscopic appearance varies from an almost pure fibrosarcoma to that showing a mixture of spindle cells, round cells and giant cells, and there are all grades in between these two extremes. In spite of this, however, the tumors show a great clinical similarity, and it is the clinical aspects to which attention is mainly directed here. As far as can be judged, the histologic characteristics are of less prognostic importance in this form of sarcoma than in growths arising in osseous tissues. For instance, in Case 4 the microscopic examination revealed a "spindle-celled sarcoma of high malignancy," but the clinical course of this case was the same as that of the others.

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METASTASES

Perhaps the most important observation is that there was no evidence of metastases in this series of cases, although the patients had been under observation for periods varying up to nine years, and several of the growths when first observed were large. This finding is not in harmony with our conception of sarcoma, and it is at variance with the experience of others. For instance, Bick believes that metastasis may be induced by improper surgical interference. Warren and Sommer consider that metastasis occurs in one-fifth of the total cases. When metastasis does occur, the favorite site is apparently the lungs. Metastasis to the regional lymphatic nodes has been described in a few cases by Warren and Meyer.

Even when the tumor appears at operation to be definitely encapsulated and it has been removed widely, sarcoma of muscle shows a great tendency to recur locally. Warren and Sommer state that "If, in a given case, one year has passed without recurrence, there will be no appreciable danger." That recurrence can, and does, occur long after this interval is exemplified by Case 4, in which the first evidence of recurrence was two years and eight months

Fig. 1—Case 3. Fibrosarcoma of the sternothyroid muscle simulating a thyroglossal cyst.

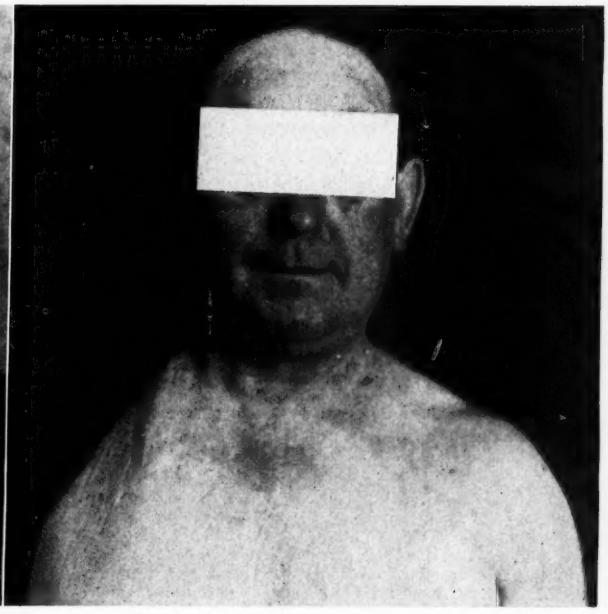

Fig. 2—Case 1. Photograph of patient after operation. A fore-quarter amputation was performed after the fifth recurrence of sarcoma of the coraco-brachialis muscle.

after the primary operation. The earliest recurrence in the limb cases was fifteen months.

Once recurrence is manifest, infiltration, regardless of the anatomic planes, occurs rapidly. This is well shown in the study of Cases 1 and 8. The primary tumor is painless until it has attained considerable dimensions. On the other hand, recurrence is often painful. Pain was present for some time before any abnormality could be elicited by palpation in Case 5. It is interesting to speculate why the recurrence should be painful. Possibly, with its increased capacity for infiltration, involvement of nerve filaments takes place earlier than in the case of the primary swelling.

RADIOSENSITIVITY

Most of these tumors appear to be completely radioresistant. In Case 7, deep X-ray therapy had been given elsewhere without the slightest diminution in the size of the tumor. In Case 1, radium had been employed without benefit. Many authors advise radiotherapy as an adjunct to surgery. This recommendation appears to be more in hope than in expectation. I have been unable to find any record in the literature where radium or deep X-ray therapy has proved curative.

TREATMENT

Enucleation of the tumor from the surrounding tissues is usually possible in early cases, but as a curative procedure it is useless. Even the more radical method of excising the whole muscle has proved to be insufficient in all of the cases, except in Case 9. In this case the patient was seventy years of age, and it is well known that tumors, in general, are less malignant when

they occur in the evening of life. When possible, not only should the whole muscle containing the tumor be removed, but excision of muscles, or at least parts thereof, in juxtaposition to the tumor, is essential.

The treatment of recurrence requires the exercise of a considerable degree of surgical judgment, but from this study it appears that in the case of a limb, if amputation is performed early enough, there is reasonable hope of a permanent cure. There is little doubt that in the majority of cases amputation is deferred too long.

CASE REPORTS

CASE 1.—R. L., a man, aged 43, was first seen on October 26, 1934. He stated that four years previously a "lump" had appeared on the inner side of the upper right arm, and an operation had been performed for its removal in 1930. In 1932, a second operation, with the insertion of radium needles, was performed. In 1933, a third operation was necessitated.

On October 26, 1934, the whole of the coracobrachialis was dissected out, including the tumor which was about the size of a walnut. It was difficult to free from the axillary artery.

On October 18, 1935, a further recurrence necessitated another operation. This time the pectoralis major was excised in addition to the site of recurrence.

On March 13, 1936, the patient having developed another recurrent nodule attached to the upper part of the tumor, an interscapulothoracic amputation of the right upper limb was carried out. At the present time, four years and two months later, the patient is perfectly well and at work (Fig. 2).

Diagnosis.—Fibrosarcoma of the coraco-brachialis muscle.

CASE 2.—E. B., a woman, aged 31, was first seen on March 1, 1932, with a swelling two inches in diameter on the inner side of the right thigh, first noticed four months previously, which had slowly increased in size. At operation on April 29, 1932, the tumor was exposed and readily separated from the surrounding muscles, but it had a broad attachment at its base to the adductor longus. The tumor and adjacent muscle were excised.

Pathologic examination showed a hard encapsulated tumor, which was slightly lobulated and attached to the muscle sheath. Microscopically, there were spindle cells, giant cells, mitotic figures and rudimentary blood vessels.

On January 16, 1934, the patient complained of pain in the scar which had been present for three weeks. The scar was found to be tender, with a small recurrence at its lower end. Accordingly, on January 26, 1934, a disarticulation at the hip joint was performed. At the present time, six years and four months later, the patient is in good health.

Diagnosis.—Sarcoma of the adductor longus muscle.

CASE 3.—This patient was seen in 1932. The tumor was removed and proved to be a fibrosarcoma of the pre-tracheal musculature. There was no sign of recurrence in December, 1939 (see Fig. 1).

Diagnosis.—Fibrosarcoma of the sternothyroid muscle.

CASE 4.—H. M., a woman, aged 42, was admitted to the hospital on October 17, 1933, with a "lump" the size of a tangerine on the inner side of the right thigh. This had been present for three months and there had been a dull ache in the tumor since it was first noticed. At operation on October 20, 1933, the mass was found to be in the vastus internus muscle, which was cut well above and below the growth, excising the mass. Microscopic examination showed the mass to be a spindle-celled sarcoma. On June 18, 1936, the patient was re-admitted with a painful tumor in the region of the scar, and on June 22, 1936, a disarticulation at the right hip joint was performed. She was re-admitted for removal of an amputation neuroma of the sciatic nerve on April 21, 1938. The patient was last seen in December, 1939, when there was no sign of recurrence.

Diagnosis.—Sarcoma of the vastus internus muscle.

CASE 5.—G. R., a man, aged 60, during the follow-up examination of a previously treated carcinoma of the floor of the mouth on January 5, 1937, complained of a swelling about the size of a tangerine on the antero-external aspect of the upper part of the right thigh (Fig. 3). This had been present for four months and was increasing in size. At operation on January 22, 1937, the tumor was excised, together with the tensor fasciæ latæ, which contained the tumor. The latter was not adherent to any of the other muscles of the thigh. The patient remained well until August, 1938, when he complained of pain in the scar. Nothing was palpable then, but in September a recurrence was palpable in the muscles beneath the scar. On October 7, 1938, a disarticulation at the right hip joint was performed, which the patient only survived by a few hours. A mass four and one-half inches in diameter was found in between the muscles of Scarpa's triangle. Microscopic sections showed this to be a fibrosarcoma with many round cells and some multinucleated cells. There were many mitotic figures present, and many primitive blood vessels. Postmortem examination did not reveal any metastases.

Diagnosis.—Fibrosarcoma of the tensor fasciæ femoris muscle.

CASE 6.—A. B., a woman, aged 47, was admitted on June 22, 1939, with a "lump" the size of a hen's egg on the posterior aspect of the right chest, about the level of the ninth rib. It was freely movable and was not tender. Local excision was performed on the same date, and the tumor was found to have the histologic characteristics of a fibromyxosarcoma, probably arising in the intercostal muscle.

Diagnosis.—Fibrosarcoma of the intercostal muscle.

CASE 7.—I. P., a woman, aged 23, was admitted on July 19, 1939, with a fixed, tender tumor below the left clavicle, about four inches in diameter. She had

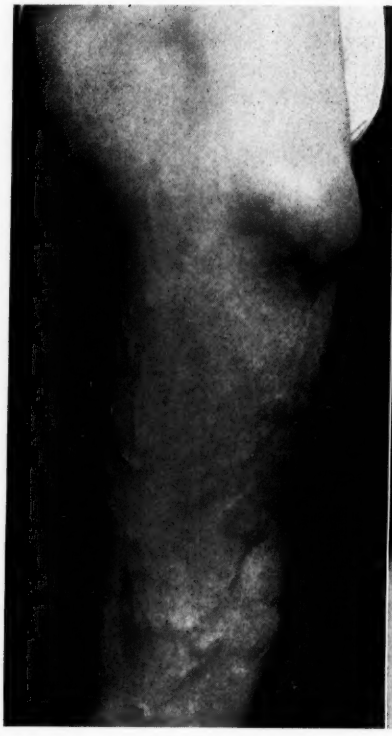

Fig. 3—Case 5. Fibrosarcoma of the tensor fasciæ femoris muscle. Death occurred.

Fig. 4—Case 7. Photograph of patient after operation. A left interscapulothoracic amputation was performed for rhabdomyosarcoma of the coraco-brachialis.

commenced about seven months previously with pain in the upper arm. Two months later the swelling first appeared, and grew gradually larger. A biopsy was performed elsewhere, and the tumor was found to be a rhabdomyosarcoma. A course of deep X-ray therapy had been given subsequently without any benefit. On admission there were signs of pressure on the brachial plexus and axillary vessels, such as to render the limb quite useless and very painful. On July 21, 1939, a left interscapulothoracic amputation was performed (Fig. 4). The tumor originated in the coraco-brachialis and the brachial plexus was partly involved in the tumor, and partly stretched out over it. Microscopic examination showed it to be a spindle-celled sarcoma, with a few giant cells at the periphery. The cytoplasm of a few of the cells was striated.

Diagnosis.—Rhabdomyosarcoma of the coraco-brachialis muscle.

CASE 8.—V. G., a child, aged 10, was seen on April 29, 1937. There was a "lump" the size of a tangerine attached to the external oblique aponeurosis above the inguinal canal on the left side. The tumor was excised widely and was found to be growing from the external oblique aponeurosis. The histologic examination showed fibrosarcoma. Deep X-ray therapy was given following the operation. The patient is quite well at the present time, three years after the operation.

Diagnosis.—Fibrosarcoma of the external oblique muscle.

CASE 9.—H. D., a man, aged 70, discovered a painless "lump" on the back of his left thigh in October, 1935. It was about the size of a hen's egg. This was removed under local anesthesia on November 5, 1935, when the whole of the semitendinosus muscle, to the lower end of which the swelling was attached, was excised. In November, 1939, there had been no sign of recurrence and the patient was in good health.

Diagnosis.—Fibrosarcoma of the semitendinosus muscle.

I wish to express my thanks to Hamilton Bailey, who operated upon all of these patients, for his help in the preparation of this paper.

I am also indebted to Dr. P. O. Ellison, Pathologist to the Royal Northern Hospital, for allowing me access to the pathologic material.

SUMMARY

Nine cases of sarcoma of the muscle are reported, the ages of the patients ranging from ten to seventy years. One death occurred. In all other cases the end-results were recovery without recurrence. Any muscle may be affected. The microscopic picture may be that of a pure fibrosarcoma or a mixture of spindle, round and giant cells. There was no evidence of metastasis in this series. Recurrence with rapid infiltration occurs frequently, even at long intervals. Most of these tumors appear to be completely radioresistant. The entire muscle containing the tumor and muscles (in whole or in part) in juxtaposition to the tumor should be excised.

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RÉSUMÉ

Sarcome du muscle

De sarcome du muscle 9 cas sont réportés; les ages varient de 10 à 70 ans. Un de ces cas mourut, dans tous les autres le résultat final fut la guairison complète sans de retours. Chaque muscle peut être intéressé. Le tableau microscopique peut être celui d'un pur fibrosarcome ou une mélange de cellules affusées, rondes ou géantes. Dans ces cas on ne put pas mettre en evidence des metastases. Retours avec rapide infiltration se rencontrent souvent, aussi à de longs intervalles. La plus grande partie de cettes tumeurs semblent être complètement radiorésistantes. L'entier muscle qui contient la tumeur et les muscles voisins à la tumeur, complètement ou en partie, doivent être enlevés.

ZUSAMMENFASSUNG

Muskelsarcom

Es wurden neun Fälle von Muskelsarcom beschrieben, im Alter von 10 bis 70 Jahren. Ein Fall mit letalem Ausgang. In Allen anderen Fällen war das Endresultat Wiederherstellung ohne Rezidive. Jeglicher Muskel kann davon befallen werden. Das histologische Bild kann entweder ein Fibrosarcom zeigen, oder ein Gemisch von Spindel- Rund- und Riesenzellen. Metastasen waren in dieser Reihe von Fällen nicht nachweisbar. Rezidive mit rapider Infiltration tritt oft auf, Sogar nach langem Intervall. Die meisten dieser Tumoren erweisen sich als vollkommen röntgenresistent. Der ganze Muskel welcher den Tumor enthält und die Muskeln, die sich in juxtaposition zum Tumor gefinden sollen (zur Gänze oder teilweise) entfernt werden.

RESUMEN

Sarcoma del músculo

Se describen nueve casos de sarcoma del músculo, en personas de desde diez hasta setenta años de edad. Ocurrió una fatalidad. En todos los otros el resultado fué mejoramiento completo sin repitición. Puede afectarse cualquier músculo. El retrato microscópico puede mostrar una fibrosarcoma pura o una mezcla de células redondas, grandes, o fusiformes. No había ninguna evidencia de metastasis en esta serie. Repitición con infiltración rápida ocurre muy a menudo, hasta a tiempo muy largo. La mayoría de estes tumores parecen ser

completamente radioresistentes. El músculo entero que contiene el tumor, y músculos que estén, en parte o totalmente, en yuxtaposición al tumor, deben ser cortados.

RIASSUNTO

Sarcoma dei muscoli

Sono riportati 9 casi di sarcoma del muscolo; le età variano da 10 a 20 anni. Uno di questi casi morì, in tutti gli altri casi il risultato finale fu guarigione senza ricorrenze. Qualsiasi muscolo può essere colpito. Il quadro microscopico puó essere quello di un puro fibrosarcoma o una mescolanza di cellule affusate, rotonde e giganti. In questi casi non fu possibile mettere in evidenza metastasi. Ricorrenze con rapida infiltrazione avvengono spesso, anche a lunghi intervalli. La maggior parte di questi tumori sembrano essere completamente radioresistenti. L'intero muscolo che contiene il tumore e i muscoli vicini al tumore, completamente o in parte, dovrebbero essere estirpati.

INTERNATIONAL ASSEMBLY

The next International Assembly of the International College of Surgeons will be held in August, 1941, in Mexico City, Mexico. Members of the United States Chapter may write to Dr. Desiderio Román, President Elect, 270 South Seventeenth Street, Philadelphia, Pennsylvania, for information.

A New Traction Device for the Immediate Treatment of Fractures

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THE splint equipment which has been prepared for the emergency treatment of fractures and dislocations of the upper and lower extremities now consists of the De Muth surgical traction halters, the Murray-Jones-Thomas arm splint, and the Kellar-Blake or Thomas leg splint. The former equipment of the first-aid dressing stations throughout the province of British Columbia was often found inadequate. Rarely, if ever, was a Thomas splint included in the equipment, and few of the first-aid personnel had been trained to use one.

Fractures sustained in the hazardous work of logging were treated either with no splint at all or one inadequately applied. In the majority of cases the patients were moved before their injuries were properly diagnosed or treated. They were not treated for shock by applying heat and stimulants, and nothing was administered to alleviate the excruciating pain while they were being removed to the first-aid station or to the hospital. The fractured limb, without a splint or one improperly applied, often permitted the jagged ends of the bones to pierce, lacerate and contuse the delicate vessels, nerves and muscle tissues.

The solution of this problem was found in a simple surgical halter or sling, devised six years ago. I believe it is an improvement in the old Collin's hitch or any other form of temporary traction apparatus now in use. There have been many alterations in the various stages of its construction. It was also discovered that the Murray-Jones-Thomas hinged or swivel splint was more suitable for fracture of the arm, and the half-ring reversible hinged Kellar-Blake modification of the Thomas splint was of more value in leg fractures or dislocations. This discovery has given the first-aid attendants a keener interest in the treatment of fractures and more confidence in their ability after proper training in its use.

The De Muth surgical halter consists of two inches of canvas webbing, to which is sewn a thick piece of felt or gutta percha sponge rubber for padding. The canvas webbing consists of two separate pieces sewn together at such an angle as to allow a perfectly snug fit around the wrist or ankle. The free ends are fastened by a simple slide buckle. It is so constructed that it pulls on the heel of the hand or foot without interfering with the arterial circulation and with very little interference of the venous return. There are two-inch elastic side straps, three-quarters of an inch wide, sewn on either side at the base of the halter and to them are attached the traction straps. The elastic straps are so interposed to overcome the possibility of too much traction being applied. With an elastic webbing at the base of the traction straps, which begins to stretch for the arm at eight pounds, and for the leg at sixteen pounds, it is almost impossible to apply too much traction (Fig. 1). However, my long experience in fractures and dislocations of the extremities has seldom brought me in contact

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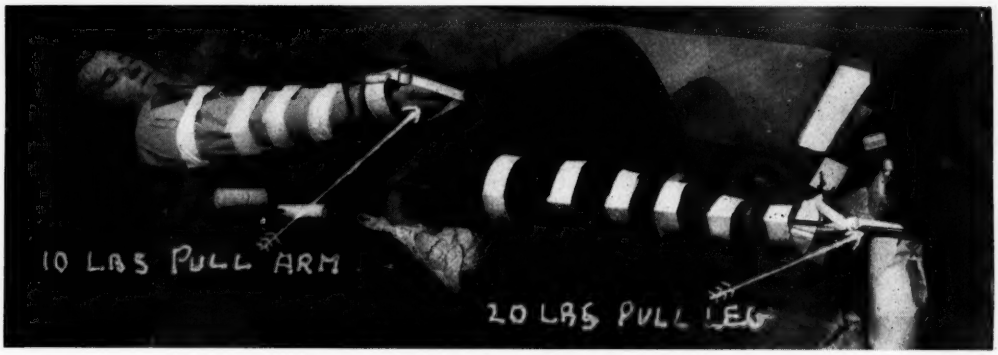


Fig. 1. Photograph showing surgical halter applied to arm and leg with traction.

with many limbs that have had too much traction. Quite the reverse has been my experience, namely, that the fractured limbs had not been properly splinted and insufficient traction had been applied.

The present procedure is to treat the men immediately where they are hurt by giving them stimulants, applying blankets, heat, and a splint. It has made a great difference to their immediate comfort, as well as an improved functional result.

The halter has been very useful for temporary traction in the surgical wards instead of pins, and in the orthopedic wards for Buck's extension in place of adhesive plaster.

Editorials

Evolution of Orthopedic Surgery

IT can be conservatively stated that, in the whole realm of medicine and surgery, orthopedic surgery is the last frontier. The rapid evolution or metamorphosis in the treatment of conditions comprising this specialty has been wrought by the ever-increasing application of surgical procedures, many of them most difficult, to an ever-widening field. Many unfortunate conditions, due to disease or trauma of bone, joint, nervous or musculature systems, or to congenital deformities heretofore regarded as hopeless, can now be corrected by means of surgery, largely of a new order, and occupy much of the surgical literature of today. The rapid and extensive evolution and development of this operative work has come within my professional lifetime, or the past thirty-five years.

In 1903, the year of my graduation from Harvard Medical School, Dr. Royal Whitman published a book on "Orthopedic Surgery." This book was outstanding in its field, having been written by a prominent orthopedist who was considered at the time progressive as to operative methods. A survey of this volume is almost startling at the present time in that, although it covers the non-operative orthopedic practice voluminously, operative methods are hardly mentioned. The same may be said of an equally well known textbook in orthopedic surgery by Jones and Lovett, published at about the same time.

The dearth of operative procedures in existence at that period is also emphasized by a review of the programs of orthopedic conventions held over an extensive period of years. This is particularly true of the American Orthopedic Association, which, above all the associations, has represented in its publications for over fifty-two years the true current thought and practice of its special field. In all of the programs from 1900 to 1910, if more than one paper per year appeared on an operative subject it was a rarity, but one needs only to glance at a program of a meeting of this same association today to realize the overwhelming and dominating position that open operative surgery has attained.

The operative work of the period from 1900 to 1910, consisted almost entirely of tenotomies, subcutaneous osteotomies and, in tuberculous joint disease, merely different types of excision procedures are mentioned. Very little tendon transplantation had been done in infantile paralysis. Whitman had not even evolved his astragaloid operation for paralytic calcaneocavus and other deformities of the feet. His only reference to astragalectomy of that date was that it could be performed in extreme cases of congenital clubfoot; he further stated that it was never indicated as a primary operation in childhood, and by no means did he assure the prevention of recurrence of the deformity.

Extra-articular or intra-articular arthrodesis of tuberculous joints, including particu-

larly the spine or the hip, had not been developed. The "shelf" operation, or other plastic operations of the hip, had not been devised. Congenital dislocation of the hip was treated wholly by bloodless methods. If reduction of the hip was possible but, because of a shallow acetabulum, failed to remain in place, there was no operative method suggested to overcome the difficulty. If reduction of the hip was impossible because of structural shortening or other reasons, or because of age, no method of building an acetabulum or socket over the head on the side of the ilium at the most favorable site was suggested.

Surgical methods had not been created for the following conditions: (1) Bony stiff joints, particularly arthroplasty to restore motion; (2) spondylolisthesis, and (3) sacro-iliac luxation or dislocation. Arthrodesis had been merely mentioned for the knee and certain small joints. In 1908 the first operation for arthrodesis of advanced osteoarthritis and other conditions of the hip was offered. Operative procedure for ununited fractures of the neck of the femur was slow to evolve, but today it is performed frequently in any busy orthopedic clinic.

The technic of bone grafting, although fundamentally unaltered since the early days of its inception by the writer, is utilized today in an ever-increasing variety of ways for derangements of the bones and joints. It was first employed in 1909 in tuberculosis of the spine and other joints, particularly the hip, for the rapid induction of ankylosis and cure of the disease. The reparative influence of the bone graft enables the surgeon to keep pace with the unfortunate sequelae of industrial and road accidents. The replacement of congenitally absent bones, such as the radius, tibia and fibula, as well as congenital non-union, may now be undertaken with assurance. The Albee bone graft spinal fusion operation has rendered the treatment of a wide variety of affections of the spine less formidable, including Pott's disease, vertebral fractures, scoliosis, spondylolisthesis and diseases of the sacro-iliac joint.

Massive resection of malignant bone tumors and immediate restoration of the removed structures by a massive bone graft has marked a new achievement for the orthopedic surgeon. Ravages of poliomyelitis have been tempered by the judicious application of arthrodesing and bone-block operations. The limitations and the wonderful possibilities of tendon transplantation are becoming more clearly defined, and a greater reliability is reposed when associated with skeletal stabilization in ingenious operative procedures. My most recent contribution in this field is concerned with the paralyzed hip, for which I have devised a method to elongate the kinesiologic lever at the top of the femur for the purpose of obtaining a more stable hip. This same procedure has been found also to be effective in a number of other conditions in which the kinesiologic lever has been shortened; namely, in epiphysitis, congenital dislocations, insufficiency of the trochanter following arthroplasty, and non-union of the hip with absorption of the femoral neck.

One might ask the question: "What has been the outstanding stimulus to the development of such a vast realm of surgery in so short a space of time?" The principal reasons for this undoubtedly are the development of the X-ray, the bone mill and the orthopedic traction - operating table, and, not least, the proof of the wonderful dependability of autogenous bone transferred from one part of the body to another. This unusual pioneer advancement has evolved largely around the ingenuous applications of the transplantation of living tissues, of which bone, cartilage, fascia, tendon, muscle, subcutaneous tissue and the skin are important.

FRED H. ALBEE

The Treatment of Infected Wounds

THE Albee technic and apparatus have been important contributions to orthopedic surgery. Not only do the fractured limbs recover in better position and with less disability, but also the immobilization provided by the bone graft technic and apparatus has gone a long way toward preventing postoperative inflammation and suppurative complications in these cases.

Many surgeons seem to have forgotten that Lord Lister's original proposal was for the *exclusion of infection* from wounds by his antiseptic method. In much of our recent surgical practice we seem to have forgotten also to what extent we may depend on the patient and his power of recovery, if this policy of excluding germs and the immobilization of injured limbs is carefully and systematically carried out. Soon after Lister's time, even his own pupils began to search for a chemical that would cure infection. That search has progressed just recently from the scheme to cure infection in the wounds to efforts to cure infection in the blood stream and the soft tissues. In my opinion these attempts are still unsuccessful.

At the beginning of the sulfanilamide campaign it was pointed out, as has been done during the popularity of mercurochrome, that no amount of any such chemical could be employed to serve as an antiseptic or for the destruction of organisms in the blood. It is conceivable, of course, that the administration of some chemical may induce a physiologic response which will contribute to the patient's recovery from pneumonia, meningitis, gonorrhea or certain types of wound infections. That efforts to cure these infectious diseases in this way are fraught with considerable danger, is indicated by the large number of liver, kidney and other kinds of poisoning that have occurred from the intravenous administration of sulfanilamide and its modifications.

There have been many reports indicating that a high percentage of recoveries may be obtained in patients with infected wounds and compound fractures by returning to the fundamental principles proposed originally by Lister. My own contribution to the Lister method was to adopt a program of débridement, exclusion of infection and immobilization, and protection of infected and inflamed parts in correct position. Over a period of about fifteen years, increasing good results were demonstrated by the employment of this method.

Finally, in 1938, Trueta reported from Barcelona (*Treatment of War Wounds and Fractures*, London) a higher percentage of recoveries in wounds inflicted under military conditions than had ever been reported previously. The subsequent adoption of these methods in England and France has borne out Trueta's claims. In my experience, from 85 to 90 per cent of all such wounds and fractures will recover if they are treated systematically by the method of immobilization and rest.

It seems unnecessary, therefore, to look further for such results as have been attributed to recent, but not new, methods of packing wounds with sulfanilamide or any other chemical. The effects of these methods do not differ in any particular from hundreds of other similar methods that have been employed. One must remember that a wound packed with sulfanilamide and left alone for a month or six weeks, is being

treated in exactly the same manner as has been suggested, except that the chemical may be active for the first few hours or days. There is no reason for attributing the eventual result to the chemical.

The method of treatment of infected wounds and compound fractures, therefore, should be débridement, drainage by means of non-antiseptic, non-irritating vaseline packs, protection against secondary infection (and trauma by infrequent dressings) and immobilization in correct position for the best physiologic function and for protection against deformity and disability. If this program is followed, a high percentage of excellent results may be obtained. The Albee technic of bone surgery, fixation by grafts and provision for early repair are all of the greatest importance in this class of cases.

H. WINNETT ORR

The International College of Surgeons' Credentials Booklet

YOUNGER surgeons of today find themselves often cut off from a source of learning that once was held to be one of the most vital parts of their education. Graduate surgery, for example, was taught under *praeceptorships ex cathedra*, and from clinics throughout the world. The changing world and the changing maps have turned upside down this method of acquiring broad acquaintance with surgical diagnoses, preoperative and postoperative care, as well as technic. It is no longer expedient for the average man to travel the world around to sample the work at diverse centers of learning. Here is another casualty of war.

That "Wanderjahr," so dear to the heart of the German student and so typical of the example followed by neophytes in other lands, has reached practically the vanishing point. Meccas of yesteryear with their magnificent teachers included Vienna, Paris, Edinburgh, Berlin, Heidelberg and other cities with their hospitals, laboratories, clinics and universities. Unfortunately, all this has changed. Opportunities for such Protean attainment have been curtailed.

To fill this gap the International College of Surgeons is making an earnest effort, with high ideals and even higher hopes. So, along these lines, the College is endorsing the idea of (if we may use the term) "*a surgical passport*" in the form of the International College of Surgeons' Credentials Booklet. This document will certify a certain amount of study, learning and ex-

perience acquired by the possessor from a teaching faculty composed of Fellows of the International College of Surgeons located in many different lands, who have the facilities and the desire to impart their own skilled knowledge to Associate Members, Members or Fellows of the College.

The curriculum will be chosen by the applicant. The institutions will be the choice of the Fellows. Attendance, examination and grades will be attested in the Credentials Booklet by the respective instructors. The sum total of credits after months or years of study will be the yardstick for the aspirant's advancement in the College itself. The College feels that this is but one of many necessary steps that it must take, if, as an institution, it is to live up to the ideals and the practicalities of its founding. The fundamentals of this idea were approved by the International Council at a recent meeting.

The ultimate result of this idea—it is expected and doubtless will so eventuate—is *better equipped surgeons better able to reach the unchanging goal of ever greater service to humanity*.

The President's Page—United States Chapter

AN ANNIVERSARY

With this issue, the Membership Letters pass into their second year. Looking back upon the comments and suggestions they have drawn from the membership, it is a fair claim that the letters have indeed served the end for which they were intended. It has been their function to keep a ready avenue of communication open between the Chapter administration and the Chapter membership.

The Chapter has come a long way during the last year through the vigor of its academic officers and the Executive Council, and in this forward process the Membership Letters have played a visibly valuable part. I can discount my own role in this effect—any series of messages consistently bent to the policy of encouraging individual effort toward the success of a worthy cause could not have failed to be helpful in achieving the same result.

It has been a source of deep gratification to me that Dr. Román, soon to assume the duties of the presidential office, shares my view that the letters serve a worthy Chapter purpose by keeping the membership intimately informed as to the gains, trends, and objectives of our development. He has signified an intention to continue the letters when his turn at the wheel comes, and I am sure his lucid processes of thought and felicitous language will extend their usefulness to the Chapter.

F. M. DOUGLASS, M.D., PRESIDENT

OUR RESPONSIBILITY

The responsibility of American surgery towards international surgery during the European or rather world-wide conflict is inescapably ours.

In the Middle Ages, and in fact in the remotest times in the history of mankind, long-lasting and devastating wars have destroyed existing medical progress and dismembered recorded experiences to such an extent that only fragments of authorship and distorted accounts were saved by courageous medical compilers and by lay literary translators migrating from war-torn communities to far distant lands, and there pieced together the remnants of medical knowledge and experiences they had saved.

The priceless legacies of philosophic, cultural and scientific Greek medicine, the enlightened heritage of the proudest period of pre-Christian medicine, suffered almost complete destruction at the hands of the barbarians of the north and the victorious Roman legions, for let us not forget the destruction by fire of the priceless library of Alexandria by Julius Caesar. Were it not for the grasp and foresight of a handful of able translators in the remnants of the Roman Empire of the east, the Byzantine, the Arabians, migrating with the Phoenicians and Saracens all along the southern Mediterranean coast to the Spanish peninsula, where they found haven and shelter and complete safety to engage in translating and in piecing together or altering the text in the confusion of languages of what was left of Greek or Greek-Roman medical lore, the basic knowledge of ancient writings would have been lost for us.

The Renaissance (14th-16th centuries), following the Dark Ages in medicine, as well as in all endeavors of knowledge, inventions and discoveries, proved that even these barbarian influences of the wars and unrest of medieval days failed to rob posterity of the relics of human intelligence.

New knowledge in astral laws and celestial bodies, under mathematic solutions, and later on Paracelsus' interpretations and presentiments, followed by advancement in physics, alchemy, chemistry, anatomy and

physiology illuminated the path of medical progress.

The World War, a quarter of a century ago, convulsed the political masses and changed the geographic lines, but medical progress forged ahead under and through the duration of the conflict, to emerge after four years' duration richer in knowledge of traumatic surgery, skeletal lesions, massive infections and reconstruction of plastic surgery. Medical progress was not handicapped; to the contrary, under huge organizations and ample equipment, there were added new experiences in surgery and allied sciences.

The present European catastrophe is now world encompassing and science and civilization are threatened as never before in all times. American surgery, in its well merited leadership and freedom, can well accept the vital responsibility of preserving for the world of science the legacies of the past and the contributions for the future.

The International College of Surgeons, a wise organization of recent birth, must properly assume the task and responsibility of safeguarding the traditions of surgery and of expanding other avenues of research and investigation with unceasing zeal. American surgery, through one of its most influential agencies—that of the United States Chapter of the International College of Surgeons, is a custodian of the world's surgery, and by virtue of the freedom of our institutions, resources and co-operation, characteristic of the "American Way," it is and shall be ours to vouchsafe not only the literary wealth we possess, but to add all possible knowledge, so that at the termination of hostilities we may find ourselves in a position to link our contributions to those gathered through war experience by our fellow members who have risked their all to save knowledge and culture.

The horrors of the present conflict, the destructive weapons and the disregard for humanity and treasures of art and science are lessons which give us warning of what may happen. The actualities would make it possible any day to hear of the complete destruction of the Hunterian Collection in London or the Dupuytren Museum in Paris. There are no limits to what may happen and the lesson is ours to benefit from. If anything is to survive the destructive and criminal methods of warfare surrounding us, we must prepare to prevent such a cataclysm and loss.

DESIDERIO ROMÁN, M.D., PRESIDENT ELECT

JOURNAL CHANGES

The Journal of the International College of Surgeons, hitherto published at the expense of the United States Chapter, has ceased to be a direct charge of that Chapter, and with the unanimous sanction of the Executive Council it is now being published by a separate corporation known as the Journal of the International College of Surgeons Publishing Company. The organization is controlled entirely by individuals within the College.

We are indebted to a Committee operating under Dr. André Crotti, President of the International College, for the working out of a publication plan which relieves the Chapter of a weighty responsibility and at the same time provides the Journal with adequate working capital.

Capital subscriptions ranging up to $1,000.00 each have been paid or pledged to the publishing corporation by a group of American members of the College. It is only fair to the members of the Executive Council to note that the bulk of the subscriptions issued from that body. This splendid generosity opens new opportunities to the Chapter. Funds hitherto encumbered by the costs of publishing the Journal can now be devoted to the development of the Chapter.

The Journal has always been published at a loss and, no doubt, will continue to lose

money for quite a long period to come.

Dr. Max Thorek, Chicago, continues as editor and he will serve as before, without salary.

A contract has been signed constituting Professional Publications, Inc., Minneapolis, Minnesota, as the business and printing agent. Our corporation, however, retains all editorial functions and reserves to itself the right to censor or reject proffered advertising. These policies are in keeping with the best practice for medical publications.

The first issue under the new arrangement was the August number. Copies of all regular issues will continue to reach the members of the United States Chapter as heretofore; their cost will be paid from the remittances for dues.

The Council and I solicit your co-operation in making the Journal the successful publication it deserves to be.

F. M. DOUGLASS, M.D., PRESIDENT

IN MEMORIAM

Thierry de Martel, M.D.

IT is with profound sorrow that we record the death of Thierry de Martel. The *British Medical Journal* (July 27, 1940), in recording his death states:

"The tragic death by suicide of Thierry de Martel, on the day on which the Germans entered Paris, robs France of one of her most distinguished sons. M. de Martel was proud of his descent from that Martel who was the "Hammer of the Saracens;" the defeat of the infidels is depicted in one of the large murals at Versailles. M. de Martel for many years had worked in his own private clinics. He used to say that the money which he made in general surgery went to support such indigents as needed his help in his neurosurgical hospital in the Rue Vereigetoix. Certainly, he lived very simply in spite of his great success. He was a skilful operator and an ingenious deviser of technical improvements. This was shown not only in his clamps for abdominal work, but especially in his power-driven drill for burring through the skull. This is one of the cleverest surgical tools ever devised.

In other ways, as well, he was an innovator. He did much to fortify Harvey Cushing in his use of local anesthesia for operations on the brain, and to minimize bleeding, introduced the sitting posture for the patient. He did pioneer work in introducing neurosurgery to France, and for many years he was the most advanced exponent of this specialization on the Continent, paying tribute to Cushing, but using his own mind very independently on the technical side. He will long be gratefully remembered as a brave and distinguished gentleman who happened also to be a surgeon of international repute."

And the *Lancet* (August 17, 1940) continued:

"Dr. de Martel, whose tragic death followed the German occupation of Paris, had many friends in this country who will remember him with affection and miss the reprints and cordial greeting cards which he used to send them so regularly. In spite of the large surgical practice which he ran from his private hospital in the Rue Vereigetoix, he found time to make many contacts abroad. He was imbued with the English tradition and probably no French surgeon was so well known over here. He spoke English easily and wherever he was addressing a Congress he was readily accepted by his audience."

THE LATE THIERRY DE MARTEL, M.D.
(From the Editor's Collection)

Of his work as a surgeon, G. G. T. writes:

"I first met de Martel in 1911, when he was demonstrating on the cadaver his well-known

trephine, which he had just perfected. He spoke with enthusiasm of the instrument and told us that he had already done 200 operations with it. At that time he was one of Victor Horsley's devoted pupils and came especially to London about once a fortnight—no easy journey in those days—to watch Horsley operate. I next saw him in 1925, at an operation session which he had arranged for members of the Chirurgical Club. It began at 8:30 and went on for the greater part of the day. He first did a series of cranial cases, but as the day went on his activities became more general and all branches of surgery seemed to be covered. He was unforgettably attired in some semblance of a military uniform and seemed to be absolutely tireless."

And thus another chapter in the life of a great surgeon who, besides being absorbed in his professional activities, worried much over world conditions, the gathering clouds of which caused him to extinguish his own luminous light. His spirit soared in the spheres of Ranzi, Knoepfelmacher, Hans Lorenz and others of Vienna; Mahler of Prague, Meyer of Berlin, Frankel, Leidler, Nobel, and the host of others whose finer sensibilities were much affected by current worldly events, and preferred self-destruction to humiliation.

THOREK

NEWS ITEMS

Congreso Internacional de Cirujanos

Se efectuará en México

A Invitación del Gobierno Mexicano, y por acuerdo unánime del Consejo Ejecutivo Internacional del Colegio Internacional de Cirujanos, la próxima Asamblea Internacional de Cirujanos, organización del Colegio, tendrá lugar en México en Agosto de 1941.

La asamblea internacional contará con dos clases de miembros: ordinarios y asistentes; los primeros, miembros precisamente del Colegio, en sus diversos grados; los segundos, cirujanos ajenos al Colegio, con carácter de asistentes exclusivamente; los representantes o delegados del país o extranjeros, tendrán el carácter de miembros oficiales asistentes.

Para fines de organización nacional, he recibido el inmerecido honor de ser nombrado por el Capítulo Mexicano del Colegio, Delegado en el Estado de Guanajuato.

Es con este carácter que me permito hacer un llamamiento a todos los medicos de Estado, especialmente a los que cultivan y ejercitan la cirugía, para que se apresten a concurrir al congreso mencionado de tan alta categoría, que constituye un evento científico de inusitada importancia nacional.

El Colegio Internacional de Cirujanos fué fundado en Génova el año de 1935.

Cuenta con Capítulos Nacionales en países de las cinco partes del mundo. Ha efectuado asambleas internacionales en diversas naciones y la última se verificó el año pasado en la ciudad de Nueva York.

El Capítulo Mexicano quedó constituído en marzo de 1939, integrado por Cirujanos de reconocido prestigio.

La próxima asamblea internacional, que se efectuará en la ciudad de México como antes decimos, en Agosto de 1941, será un acontecimiento que honre a México y que debe despertar el mayor entusiasmo entre todos los cirujanos del país.

DR. BENJAMIN GONZALEZ N.

Dr. William Seaman Bainbridge Honored

On September 30, Dr. William Seaman Bainbridge, International Treasurer of the International College of Surgeons, received the diploma and decoration with the insignia of "El Sol del Peru" from the Peruvian Government in recognition of his contributions to medicine and surgery. The ceremony took place in the office of the Consul General of Peru at Rockefeller Plaza, New York City.

Montana Guild Meeting

Dr. Charles H. Arnold, Director of the postgraduate study guilds for the West, presided at the meeting of the Montana Postgraduate Study Guild held at the Park Hotel, Great Falls, Montana. A number of new applications have been received from representative surgeons from the principal cities of Montana. Plans are being formulated for a scientific meeting of the Montana Postgraduate Study Guild during the winter season or early spring.

Nebraska Guild Meeting

Officers of the Nebraska Postgraduate Study Guild, under the Presidency of Dr. E. C. Henry, met at the University Club in Lincoln, Nebraska, on Monday evening, September 30. Plans were formulated for the autumn Guild meeting to be held in Omaha the latter part of November.

ROBERT C. OLNEY, M.D., SECRETARY

Toledo Guild Meetings

The Toledo Guild will meet regularly at 7:00 p.m. each week at St. Vincent's Hospital. The meetings will be open not only to the Guild members, but also to those of other hospital staffs. There are no dues. The usual attendance has ranged from 18 to 20 members.

The programs will consist of discussions of all staff cases of the preceding week. Case assignments will be made to various members or groups for a review of the literature pertaining to their individual cases, which will be reported at a later meeting. For example, a recent group study was made of head injuries. In another instance a three-months' course in surgical anatomy was given by Dr. Paul Holy. This course consisted of lectures and dissections. A course in pathology is now in progress and will be given under the guidance of Dr. Thomas Ramsay.

The meetings offer an invaluable opportunity to young surgeons to "rub elbows" with their elders and to study under the supervision of mature surgeons. Such exchanges of ideas and reactions are stimulating.

Dr. Fred M. Douglass, President of the United States Chapter, is referee for the semester. Dr. James I. Collins is President, and Dr. W. A. Band is Secretary.

New England Guild Meeting

The New England Activities Committee of the United States Chapter of the International College of Surgeons held its regular bimonthly meeting at the Bond Hotel in Hartford, Connecticut, on September 19, 1940. This meeting was called for the specific purpose of formulating the winter's program of the Guild work of the United States Chapter.

It was voted to continue with the same method of procedure, to hold committee meetings on alternate months, and also a Guild meeting every other month. Thus, six Guild meetings will be held during the year, one for each of the New England States. The first Guild meeting will be held at the Massachusetts State Cancer Hospital, Westfield, Massachusetts, on Thursday, October 10, 1940. The second Guild meeting will take place in New Haven, Connecticut, on Thursday, January 9, 1941.

Programs for both of these meetings have been outlined and sub-committees have been appointed for the completion and organization of their functions.

GEORGE S. FOSTER, M.D., Chairman

Colorado Guild Meeting

A report has been received from Dr. M. O. Shivers, Senior State Regent for the State of Colorado, of the recent meeting of the Colorado Postgraduate Study Guild. Plans for a fall scientific postgraduate session are in progress. A number of applications from surgeons in Colorado have been received.

Book Reviews

Bone Graft Surgery in Disease, Injury and Deformity. By Fred H. Albee, M.D., LL.D., Sc.D., F.A.C.S., F.I.C.S. President Elect, International College of Surgeons; Past President, American Orthopedic Association; Chairman, Rehabilitation Commission of the State of New Jersey. Assisted by Alexander Kushner, M.H., B.Sc. Foreword by H. Winnett Orr, M.D., F.A.C.S., Past President, American Orthopedic Association. Price $7.50. Pp. 403, with 301 illustrations (8 colored plates). New York-London: D. Appleton-Century Co., 1940.

THIS work on Bone Graft Surgery by one of the world's acknowledged pioneers in orthopedic surgery, brings up-to-date and in one volume the many excellent surgical procedures now used by leading orthopedic surgeons here and elsewhere. The text is written in a simple, clear, easily understandable and concise language. The illustrations are abundant and clearly explained by voluminous subnotes. In reading this book one must not get the idea that Dr. Albee advocates bone grafting in every type of case for which an operation is described in the text. He does, however, clearly show how and where bone grafting can be of great value and how the best results may be obtained. The procedures advocated for treatment of congenital absence of such bones as the radius and tibia and congenital dislocations are excellent. The use of bone grafts for certain lesions of the spine is abundantly covered. Here, of course, the name of the author is resplendent with his original contributions to the subject. One need only recall the blessings and relief afforded in such conditions as Pott's disease, fractures of the vertebrae, spinal curvature, spondylolisthesis, sacro-iliac affections by the Albee bone graft-fusion operation. Not only are technical details lucidly depicted but the "why and wherefore" of the bone graft peg in central fracture of the neck of the femur when there is rupture of the ligamentum teres at the time of the fracture, is thoroughly discussed.

Stabilization operations *versus* tendon transplantations are stressed in certain conditions. The author recently devised a new method of treatment (surgical) of the paralytic hip. This is thoroughly described and its rationale stressed in such conditions as epiphysitis, destruction from tuberculosis, congenital hip dislocation, etc. The author, besides being a pioneer in the development of surgical procedures, has been equally noted for his contributions to the surgical armamentarium of this rapidly growing specialty. Just to mention his "bone mill," which reduced effort to a minimum and raised efficiency to a maximum.

H. Winnett Orr justly emphasizes in his Foreword, in speaking of the author's contributions in this field: "He (the author) has carried all the rest of us along with him to better work in wider fields and to greater advancement than any one could have dreamed of in the first years of his proposed bone graft operations."

His description of the bone graft peg for cases of central fracture of the neck of the femur is easy to follow. Interesting procedures for the treatment of selected cases of malignant bone tumors by massive bone grafts is abundantly covered in the text. History recalls the author's profound studies in bio-physics, one of the resultant contributions being the proof based upon animal experimentation, the physiologic impossibility of heterogeneous bone grafting. Throughout the entire work the reader is intrigued and impressed with the profusion of stimulating facts. All in all, it may be summarized by saying that this classical opus from the fertile pen of a master in the specialty should be in the library of every student, as well as the general and specialty surgeon; in fact every physician interested in the progress of medicine should read it. A cordial reception of this work by the profession is a foregone conclusion.

K.

Physical Signs in Clinical Surgery. By Hamilton Bailey, F.R.C.S. (Eng.), Surgeon, Royal Northern Hospital, London; Surgeon and Urologist, Essex County, Council External Examiner in Surgery, University of Bristol. Seventh Edition. Price, $6.50. Pp. 310, with 337 illustrations, some in color. Baltimore: The Williams & Wilkins Company, 1940.

THE LATE Nicholas Senn justly taught that to be a successful surgeon one must first be a well informed physician, and the latter, of necessity, an accomplished diagnostician. Hamilton Bailey supplies in this splendid volume the didactic means to accomplish that end. It is an excellent contribution to contemporary literature and an indispensable addition to every student's and surgeon's library. The style of presentation is superbly characteristic of the accomplished author. Only essentials are pointed out to the reader. There is no padding. The work is divided into 26 chapters. These encompass basic physical signs, symptoms and almost all examinations with which the surgeon should become conversant. The illustrations are delightful, as are all those embellishing the author's works. One need only to follow these with the text to become promptly convinced of the great merit of this fine book. A study of the illustrations, many of which are beautiful color reproductions and following the same with the crisp illuminating text, will impress the reader promptly as an indispensable addition to his library. Signs and symptoms referred to by name identify the author of that particular sign and symptom in a footnote. These are found on almost every page throughout the book, *e.g.*, "Boas Test — footnote: Ismar Boas, 1858-1938. Gastro-enterologist, Berlin." "Monk's Method of Intestinal Localization—footnote: Geo. H. Monk, 1885-1933. Surgeon, City Hospital, Boston, U.S.A." This reviewer regretfully notes how frequently those who have contributed to our present-day knowledge are soon forgotten. The revision of many anatomical terms is in line with this statement. Bailey, in a refreshing manner, recalls briefly the pioneers, thereby adding historic material, thus reintroducing many historic figures to the reader. The color photography is superb. The index is thorough. That this work will meet with continued success is a foregone conclusion. The German edition, having been released in 1939, and

editions in Portuguese, Italian and Dutch being under preparation, bespeaks the popularity of this fine volume from the pen of a great teacher and an outstanding surgeon.

M. T.

Atlas of Cardioroentgenology. By Hugo Roesler, M.D., F.A.C.P., Associate Professor of Roentgenology, Cardiologist in the Department of Medicine, Temple University School of Medicine and Hospital, Philadelphia. Price, $8.50. Pp. 124, with 237 illustrations. Springfield: Charles Thomas, 1940.

THIS work depicts the changes in the form and structure of the heart and great vessels and the lesser circulation, as revealed by roentgen rays in normal and pathologic states. Particularly are the more common diseases of the heart illustrated and described. It is not a work for the radiologist alone but the cardiologist, internist and pathologist will also find it of immense value. Particularly is this true since roentgenology by itself is not stressed as the only criterion, but is correlated with electrocardiographs, clinical and laboratory studies which are analyzed, and conclusions are drawn from the composite. A few of the outstanding features are "Normal conditions;" "Postural changes as observed in the lungs and in heart disease;" "Changes brought about by hypertension, emphysema, myocarditis, coronary diseases," etc. This excellent work is embellished by 237 large illustrations. Case reports form an integral part of the volume. Of the 60 cases cited, 28 have been verified by postmortem examinations. This volume can be highly recommended to every progressive medical man.

E. K.

Pye's Surgical Handicraft. Edited by Hamilton Bailey, F.R.C.S. (Eng.), Surgeon, Royal Northern Hospital, London; External Examiner in Surgery, University of Bristol (with the assistance of twenty-nine contributors). Eleventh Edition. Price, $6. Pp. 512, with 362 illustrations. Baltimore: William Wood and The Williams & Wilkins Company, 1939.

HAMILTON BAILEY is a conscientious, competent and indefatigable worker. His writings are refreshing, authoritative and instructive. He is endowed with a peculiar talent of separating essentials from nonessentials and presenting them in a most engaging manner. This edition of "Pye's Surgical Handicraft," under Bailey's able editorship with the assistance of capable collaborators, embodies an exceptionally fine combination of worthwhile effort. The arrangement of the text is of the same type as Bailey's classical "Emergency Surgery" so well known in this and other countries. The volume embodies every phase of practical information relating to surgical handicraft. Bailey's policy to supply "in an accessible form practical information required by the reader," has ably fulfilled its mission. The work embraces seventy-three chapters. The illustrations are of the usual high type so characteristic of all of Bailey's writings. His editorial staff have done justice to a rather difficult task. To analyze every chapter would take us too far afield. One may say without reservation that all are excellent. Of particular interest are the chapters dealing with the "Rectum;" "Catheters and Catheterization;" "Plaster-of-Paris Technic;" "Fractures;" "Anesthesia;" "Medical Operations;" "The Work of the House Surgeon in Radiology;" "Preparation for Operation;" "Management of Gastric Crises," etc. Writers appreciate the hard task of preparing a volume for publication and the tremendous labor entailed in its culmination. The printing and illustrations together make this book one of the very best of its kind in the English language. It should be read by every student and kept at his side as a guide. The index is excellent, affording quick reference to the very numerous items dealing with minor surgery, and pre- and post-operative care of major surgical procedures. For the student, house surgeon and every medical man, this volume represents an indispensable addition to their libraries.

M. T.

Les "Pièges" de la Chirurgie en Diagnostic et Therapeutique: Erreurs et Fautes ou Faits Presumes tels Conditions et Limites de la Responsarilite. By Prof. E. Forgue, Member de l'Academie de Chirurgie, and Prof. Aimes, Professeur agrege a la Faculté de Montpellier. Price, 120 francs. Pp. 509. Paris: Masson et Cie, 1939.

THE term "piège" signifies snare. The authors prefer this term as being descriptive and analogous to sign posts, warning the surgeon of the pitfalls and errors in surgical practice. Considerable space is allotted to medico-legal aspects of the subject matter under consideration. Errors in diagnoses, indications for surgical intervention and other correlated factors are crisply discussed. Case citations are presented with suggestions as to how to circumvent failures. The presentation of the subject matter is concise and instructive. It is recommended for those who read French. The bibliography is interspersed in the text. The binding and printing are excellent.

K.

Jewish Contributions to Medicine in America, from the Colonial Times to the Present Day. By Solomon R. Kagan, M.D. Second Edition, revised. Price, $3.50. Pp. 792. Boston: Boston Medical Publishing Company, 1939.

THIS work is a survey of the scientific achievements of American Jewish physicians, especially in the field of medicine, its object being to show that medicine belongs to humanity at large and that the believers in Judaism have made a distinct contribution to the storehouse of medical knowledge. This second edition includes an account of the persecutions which Jewish physicians have undergone in Central Europe during the last few years. Chronological order is followed in the development of the theme, beginning with two Jews who belonged to Columbus's crew: Maestre Bernal, the ship's physician, and Marco, the ship's surgeon. The book is the result of careful and scholarly research and well serves as a special contribution to the history of medicine.

M. T.

Peripheral Vascular Diseases: Diagnosis and Treatment. By William S. Collens, M.D., Chief of the Clinic for Peripheral Vascular Disease and of the Diabetic Clinic, Israel Zion Hospital, Brooklyn, and Nathan D. Wilensky, M.D., Assistant in the Clinics. Price, $4.50. Pp. 243. Illustrated. Springfield, Illinois: Charles C. Thomas, Publisher, 1939.

THE book consists of two parts, the first being on the anatomy and physiology of the peripheral vascular system, with methods of diagnosis of peripheral vascular diseases, the second being a detailed account of methods of treatment. Methods are set forth impartially, without a confusing mass of data on results. The outstanding method consists in the use of the author's own intermittent venous occlusion apparatus. Little doubt is left in the reader's mind as to the success of this method. The method brings about maximum states of vasodilatation either by stimulating the vasodilators or suppressing the vasoconstrictors. At the same time, the limb is protected for a sufficient period to allow nature to develop an adequate collateral circulation. The book is well arranged, helpfully illustrated and of distinct value to the medical man keeping abreast of modern medical progress.

M. A.

Circulatory Diseases of the Extremities. By John Homans, M.D., Clinical Professor of Surgery, Harvard Medical School. Price, $4.50. Pp. 330. New York: The Macmillan Company, 1939.

ONE of the outstanding features of this book is the succinct way in which criteria for the interpretation of symptoms are given. Pain in an extremity usually means arterial deficiency; sudden, persistent, agonizing pain usually means sudden arterial closure. Pallor indicates constricted vessels; cyanosis means a slow current, in the veins or arteries. Swelling may indicate one of a number of disorders, differentiation for which is presented. The author tests the ability of the vascular bed to dilate by giving the patient a drink of spirits. The object of the book is to help the practitioner to recognize the common conditions and to treat them successfully. Case reports, clinical descriptions and illustrations give adequate support to the author's statements. The work is authoritative and well presented.

T. P.

Functional Disorders of the Foot, Their Diagnosis and Treatment. By Frank D. Dickson, M.D., F.A.C.S., Orthopedic Surgeon, St. Luke's, Kansas City General and Wheatley Hospitals; and Rex L. Diveley, A.B., M.D., F.A.C.S., Orthopedic Surgeon, St. Luke's, Kansas City General and Wheatley Hospitals. Price, $5. Pp. 305, with 202 illustrations. Philadelphia: J. B. Lippincott Company, 1939.

THE authors have produced this book in recognition of the need felt by the general practitioner for more precise knowledge of disorders of the feet and their treatment. The fundamental reasons for foot imbalance in the adolescent and the adult are presented on the basis of the anatomy, physiology and development of the foot from birth to maturity. Proper foot apparel, strapping and correctional foot exercises are prescribed as methods for relieving and preventing disorders of this much neglected part of the body. The work is to be commended for the excellence of its format and for the fact that it will equip the physician with knowledge which will enable him to treat disorders heretofore relegated to the care of a cutter of corns and a shoe salesman.

T

Diseases of the Gallbladder and Bile Ducts. By Waltman Walters, B.S., M.D., M.S., Sc.D., F.A.C.S., Head of Section in Division of Surgery, The Mayo Clinic, Professor of Surgery, The Mayo Foundation (University of Minnesota); and Albert M. Snell, B.S., M.D., M.S., F.A.C.P., Head of Section in Division of Medicine, The Mayo Clinic, Professor of Medicine, The Mayo Foundation. Price, $10. Pp. 645, with 342 illustrations on 195 figures. Philadelphia: W. B. Saunders Company, 1940.

CHOLECYSTOGRAPHY, cholangeography, dietetics, methods of determining the prothrombin time and the symptoms which may follow cholecystectomy or other surgical procedures on the gallbladder are discussed in this excellent work on diseases of the gallbladder. One chapter deals with the differential diagnosis of jaundice and associated conditions. In the section on preoperative and postoperative management, special attention is given to the jaundiced patient and the use of vitamin K in controlling hemorrhagic diathesis. The material is based on a review of the experience of the Mayo Clinic for more than half a century. Physiology and anatomy of the biliary tract are reviewed, but theoretical detail is limited to the material considered essential to the better understanding of the points under discussion. Each chapter ends with an extensive bibliography, with acknowledgement of the contributions of others in this field. The book contains material which, on the whole, is too far advanced for the medical student, but the surgeon and internist will find it invaluable.

O. R.

Congenital Cleft Lip, Cleft Palate and Associated Nasal Deformities. By Harold Stearns Vaughan, M.D., D.D.S., F.A.C.S., Professor of Clinical Surgery, New York Post-Graduate Medical School, Columbia University, New York. Price, $4. Pp. 210, with 259 engravings. Philadelphia: Lea & Febiger, 1940.

THE author has crystallized the results of many years of teaching and operating in this book, which was written at the solicitation of his students at the New York Post-Graduate Medical School of Columbia University. These students were unable to find the subject covered elsewhere concisely enough to enable them to grasp the essential features in the time allotted to them in the course of study. Thus the work is a combination of the methods used by others and by the author. It is suggested that the operation for cleft palate should not be performed before the child is 18 months old, and that the most favorable

time is between the second and third years. The teaching of correct speech is of primary importance following operation. The success of this teaching will depend upon the degree of palatal mobility which remains after healing has occurred. Cleft lip may be corrected between the ages of two weeks and two months. The repair of the lip is accomplished with greater difficulty than is repair of the palate. From its first chapter on "Embryology" to its final chapter on "Continued Supervision of the Cleft Lip and Palate Patient," the book is a comprehensive treatise on the subject, its value to the reader being enhanced by the exceedingly fine illustrations.

O. R.

Pioneers in Acute Abdominal Surgery. By Zachary Cope, B.A., M.D., M.S., F.R.C.S. (England), Surgeon to St. Mary's Hospital, Paddington, etc. Price, $1.75. London: Oxford University Press, Humphrey Milford, 1939.

THIS reviewer prizes this work because of the readiness with which he may find historical surgical data by consulting it. A table arranged in chronological order, from 1556 to 1895, with the names of the surgeons who first performed various operations, is one of the commendable features of the book. In addition, the text supplies data as to each type of surgical procedure which has been carried out for the relief of acute abdominal diseases, with the name of the surgeon who first performed the operation, the comment made at the time of the operation by either the surgeon or the onlooker, and the author's own comment. The book is concise and obviously is not intended as an exhaustive study on medical history.

E. K.

Tumors of the Skin, Benign and Malignant. By Joseph Jordan Eller, M.D., Attending Dermatologist, City Hospital; Consulting Dermatologist, French Hospital, Broad Street Hospital, New York City. Price, $10. Pp. 607, with 408 illustrations. Philadelphia: Lea & Febiger, 1939.

SEVERAL decades of experience in physiotherapy have provided an excellent background for the author in his compilation of this much needed work. He has achieved his purpose of giving in a single comprehensive practical volume all the available information on the diagnosis and treatment of benign and malignant tumors of the skin, and he has made use of photographs to present his observations succinctly and with exactitude. Under benign tumors he treats neoplasms of connective tissue origin. There are discussions on tumors originating from muscle or nerve tissue, nevi and other developmental disturbances, tumors of infectious origin, as well as precancerous conditions of the skin. Under malignant tumors of the skin he describes carcinoma, malignant melanoma, sarcoma, etc. Lymphomas, cutaneous surgery and plastic repair of skin tumors are described. In the appendix he includes data on radiation physics and biology, with dosage tables and charts to be used for determining procedure and dosage to be employed. This reviewer feels that the work will enjoy well merited popularity by all interested in the subject.

I. T.

Diagnosis and Management of Diseases of the Biliary Tract. By R. Franklin Carter, M.D., F.A.C.S., Associate Clinical Professor of Surgery, New York Post-Graduate Medical School, Columbia University, New York; Carl H. Greene, Ph.D., M.D., F.A.C.P., Associate Clinical Professor of Medicine, New York Post-Graduate Medical School, Columbia University; and John Russell Twiss, M.D., F.A.C.P., Assistant Clinical Professor of Medicine, New York Post-Graduate Medical School, Columbia University. Price, $6.50. Pp. 432, illustrated with 84 engravings with 6 plates. Philadelphia: Lea & Febiger, 1939.

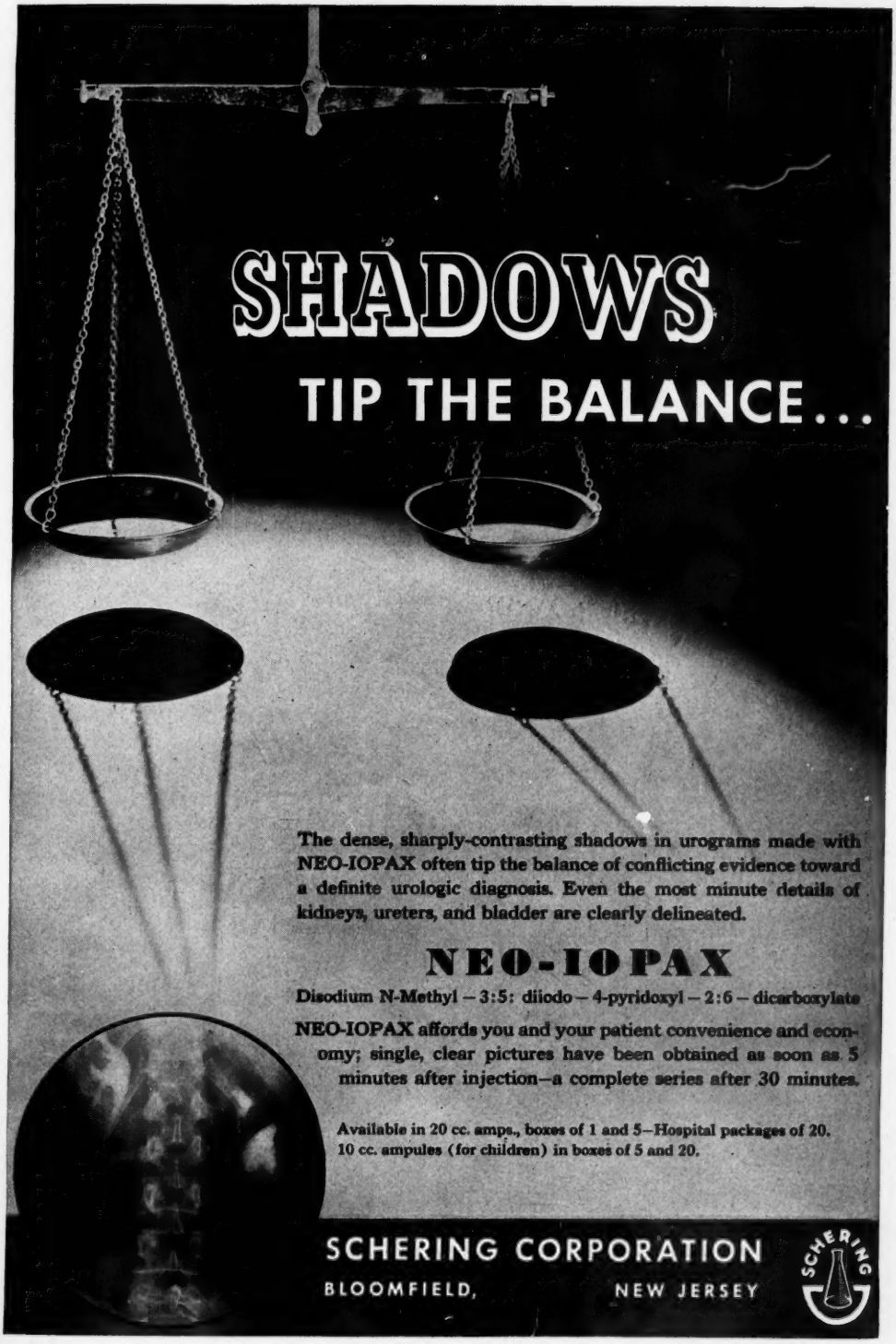
THE book is an excellent record of the experience of a single gallbladder clinic over a period of years, with the results of the clinical and roentgenologic studies of representative cases. The work is of especial value because it correlates the findings of the roentgenologist, bacteriologist, physician, surgeon and biochemist from the staff of this clinic and of other specialists of the New York Post-Graduate Medical School and Hospital of Columbia University. The work is divided into six sections: etiology, diagnosis, medical treatment, surgical management, results of operative treatment and appendix. Various types of biliary dysfunction are considered and medical and surgical indications are fully discussed. Conclusions are drawn from the results presented. It has been found that patients suffering from dysfunction of the sphincter of Oddi are unimproved by cholecystectomy; the conclusion is drawn that surgery is not indicated in biliary dyskinesia. A bibliography is appended to every chapter. The book can be highly recommended. It is a sincere evaluation of the subject matter.

E. K.

Diseases of the Mouth and Their Treatment: A Textbook for Practitioners and Students of Medicine and Dentistry. By Herman Prinz, A.M., D.D.S., M.D., D.Sc., Dr. Med. Dent.; and Sigmund S. Greenbaum, B.S., M.D., F.A.C.P. Second Edition, revised. Price, $9. Pp. 670, with 324 engravings and 12 colored plates. Philadelphia: Lea & Febiger, 1939.

THE revised edition of this work should be of increasing value to the dentist and to the practitioner because of the additional material presented. This includes Dr. H. R. Churchill's contribution of his classification of tumors of the mouth; a chapter on lymphadenitis; and articles on sarcoidosis, hereditary pseudohemophilia, Paget's disease and Schüller-Christian's disease. Various specialists have supplied information on such subjects as harelip and cleft palate, microscopic technic, roentgenographic examinations, mouth breathing, and diseases of the mouth associated with nervous disorders. Inasmuch as the symptoms of many systemic diseases appear in the mouth, this book should especially interest the dentist, who frequently has the opportunity to observe and diagnose the condition before the patient deems it necessary to consult a physician. The practitioner should find it indispensable as an aid to diagnosing systemic disease and to treating disorders localized in the mouth.

T. H.



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Cancer of the Larynx. By Chevalier Jackson, Jr., M.D., Sc.D., LL.D., Consultant in Bronchoesophagologic Research, Temple University Medical School, Philadelphia; and Chevalier L. Jackson, A.B., M.D., M.Sc., Professor of Bronchoesophagology, Temple University Medical School. Price, $8. Pp. 309, with 239 illustrations. Philadelphia and London: W. B. Saunders Company, 1939.

WITHOUT wasting time on preliminaries, the authors plunge into a description of procedures in the first section of the book, thereby enhancing the value of the volume to the surgeon, who will find it a handy reference source. The first sentence sets the keynote for the work by stating that cancer of the larynx is curable in 80 per cent of the cases if the diagnosis is made early, seldom or not at all when the diagnosis is made late; and that persistent or intermittent hoarseness in an adult means cancer until proof to the contrary has been furnished. Articulate speech after laryngectomy is treated briefly but the facts presented are informative. A conservative attitude is adopted in the discussion of treatment of cancer by irradiation. The work is divided into three parts: procedures, general considerations and historical notes. Illustrations in color and in black and white portray the larynx in various diseased conditions and add greatly to the attractiveness of the book. Not since Thompson's publication in 1930 has the subject been treated with such thoroughness and clarity. It is a fine work and can be warmly recommended.

T.

Inhalation Anesthesia. A Fundamental Guide. By Arthur E. Guedel, M.D., Associate Clinical Professor of Surgery, University of California School of Medicine, Berkeley. Price, $2.50. Pp. 172. New York: The MacMillan Company, 1937.

FOR the student of anesthesia and the professional anesthetist, this volume can be highly recommended. Its title, "A Fundamental Guide," runs true to its contents. Armed with a thorough knowledge of fundamentals, experience completes the standards for a competent anesthetist. Dr. Guedel endeavored to point out landmarks necessary to reach a destination and avoid unnecessary detail; in this he has admirably succeeded. The work is divided into three parts embodying eight chapters. It will be well for everyone resorting to anesthesia as a routine or emergency procedure to possess this work as a worthwhile guide. The index is thorough and the text is crisp, to the point and illuminating. It will well repay any medical man to acquire this excellent volume.

K.

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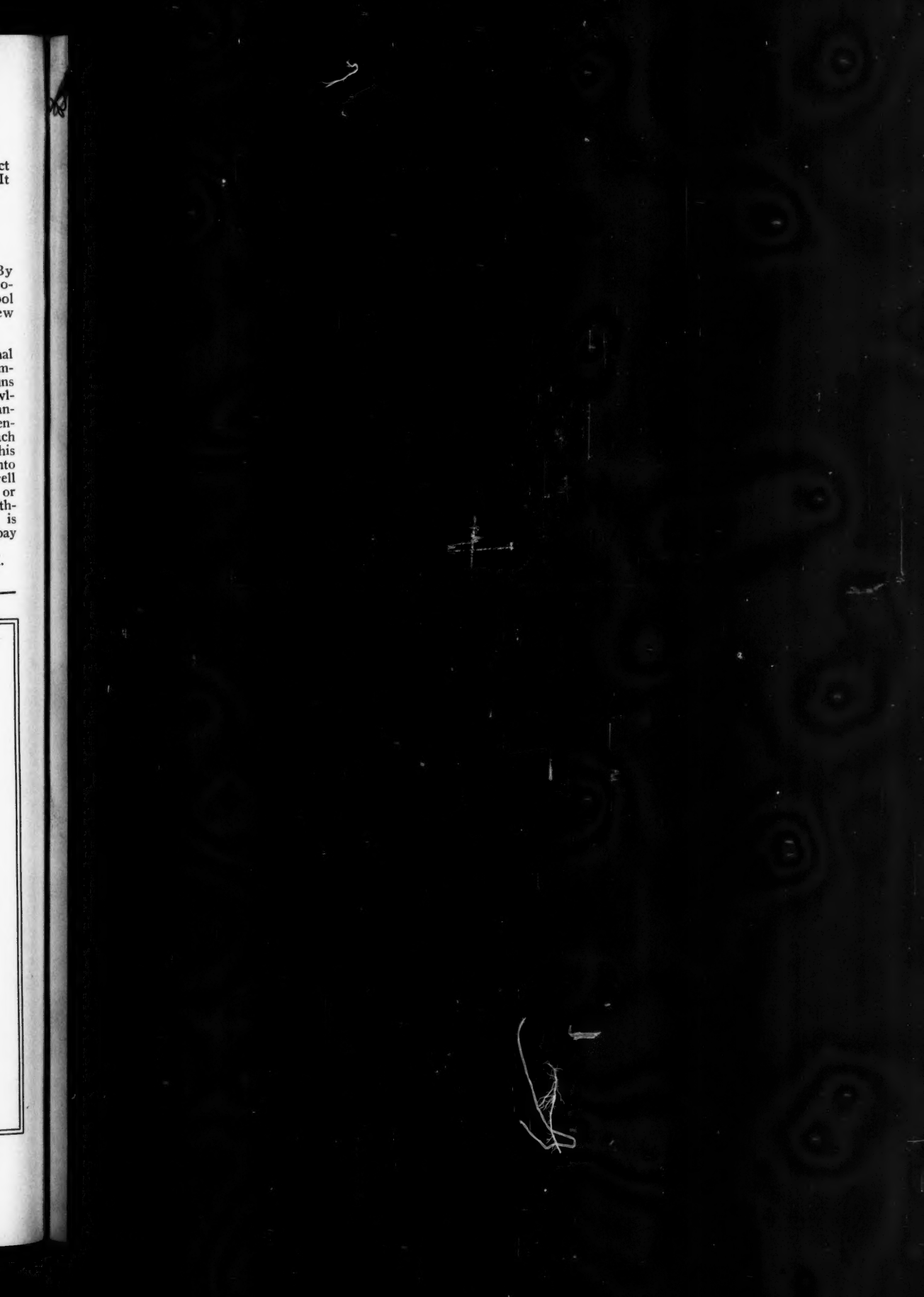
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